GLOBAL CLIMATE HIGHLIGHTS

MAJOR CLIMATIC EVENTS AND ANOMALIES AS OF MARCH 9, 1991

1. Western United States:

MORE PRECIPITATION REDUCES SHORT-TERM MOISTURE DEFICITS.

Generally 35–100 mm of precipitation fell across the northern half of California, with totals up to 250 mm in higher elevations along the Sierra Nevadas. Lesser totals (10–35 mm) dampened the northern Intermountain West while little or no rain was reported in southern California. The recent precipitation has brought an end to short-term (four to six week) moisture deficits in much of the region, although departures of -50 mm to -75 mm still lingered along the northern California coast and shortfalls of 130–190 mm remained in the highest elevations of southern California. Seasonal and multi-year deficits, however, remained very high and were only slightly affected by the storminess [Ended after 10 weeks].

2. Southeastern North America:

PRECIPITATION SLACKENS, BUT MOISTURE SURPLUSES REMAIN UNFAVORABLY HIGH.

Less than 15 mm fell along the saturated central Gulf Coast, providing some relief from this year's inundating rainfall, but near to slightly above normal precipitation was measured across the remainder of the region. Up to 55 mm of rain kept the east-central Gulf Coast abnormally wet, and amounts of 15–50 mm similarly affected northern Mississippi and Alabama, the southern Appalachians, and the Ohio Valley. Slightly heavier precipitation (35–70 mm) fell on the central and northern Appalachians. Since late January, more than twice the normal rainfall has been observed in the Florida Panhandle and along the central Gulf Coast, and departures of 55–320 mm have accumulated throughout much of the Deep South [15 weeks].

3. Central Europe:

DRYNESS PERSISTS IN EASTERN AREAS WHILE WARM WEATHER ACCOMPANIES INCREASED PRECIPITATION FARTHER WEST.

Moderate to heavy precipitation improved moisture conditions across northern Italy, the Alps, southern and eastern France, and much of Spain. Much of extreme northern Italy, northwestern Spain, southern Spain, and scattered parts of southeastern France measured 50–100 mm while 20–50 mm dampened remaining areas. Farther east, however, fewer than 20 mm kept much of central and eastern Europe very dry, with six-week departures of 75–200 mm common [12 weeks]. In western sections unseasonably high temperatures (weekly departures of +3°C to +8°C have accompanied the moderate precipitation from France eastward through Germany and northern Yugoslavia for the second consecutive week [2 weeks].

4. Central and Western Sahel:

WARM WEATHER DIMINISHES.

Weekly departures of +1°C to +3°C affected portions of the west-central Sahel, particularly in northern Burkina Faso and southern portions of Mali and Niger, but near normal conditions returned to central areas as cooler air expanded westward from Ethiopia [Ending after 6 weeks].

5. Southern Africa:

WET SPELL ENDS AS ABNORMALLY HIGH TEMPERATURES DEVELOP.

Moderate precipitation (40–80 mm) fell across northeastern South Africa and northern Zambia, but most locations measured less than 30 mm, bringing an end to recent rainfall surpluses [Ended after 9 weeks]. Anomalously hot conditions, however, continued for the second successive week, with weekly departures of +2°C to +4°C observed across the eastern half of South Africa, Zimbabwe, eastern Botswana, and southern Zambia [2 weeks].

6. The Philippines:

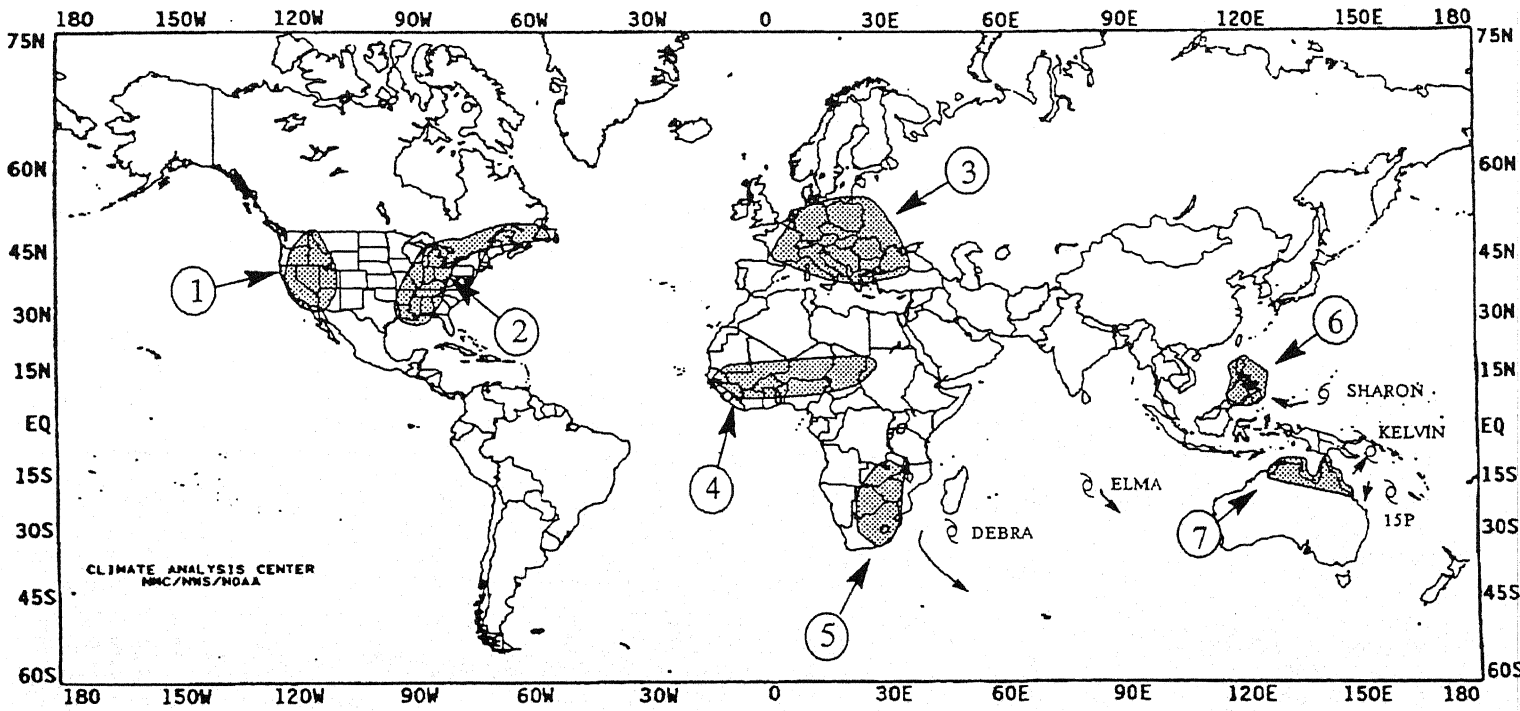
A VERY DRY WEEK.

Fewer than 7 mm of rain fell throughout the region, intensifying the drought situation. Since late January, deficits of 200–420 mm have accumulated over parts of the central islands, southern Luzon, and northern Mindanao [14 weeks].

7. Northeastern Australia:

EXCESSIVE WETNESS FINALLY ENDS.

Moderate rains (30–60 mm) fell across the northern Cape York Peninsula, but only light rain was observed across the rest of the region, bringing relief from the recent period of excessively heavy rainfall, particularly along the east-central Queensland coast [Ended after11 weeks].



EXPLANATION

TEXT: Approximate duration of anomalies is in brackets. Precipitation and temperature data are this week's values, unless otherwise indicated.

MAP: Approximate locations of major anomalies and episodic events are shown. See other maps in this Bulletin for current two-week temperature anomalies, four-week precipitation anomalies, longer-term anomalies, and other details.

UNITED STATES WEEKLY CLIMATE HIGHLIGHTS

FOR THE WEEK OF MARCH 3 THROUGH MARCH 9, 1991

For the second straight week, a series of Pacific storm systems moved into the Far West, spreading generous precipitation from Washington southward to central California. Between 2 and 4 inches of precipitation fell across the region, with nearly 10 inches measured in parts of the Sierra Nevadas (Figure 1). In the higher elevations, several feet of snow were common, raising the snowpack water equivalent from approximately 10–15% of normal before the storms up to 30–35%, but still well below average. In addition, water storage behind eight major dams in northern California increased by almost 400,000 acre-feet [equivalent to two-thirds of Los Angeles' annual usage] since the end of February, according to the Federal Bureau of Reclamation in Sacramento, CA. To the east, heavy snow and wind gusts to 75 mph produced blizzard conditions across parts of the northern and central Rockies. Winter Park, CO received 27 inches of snow while 2 feet blanketed the Wind River Mountains in Wyoming. Another strong storm system tracked across the Atlantic Coast states, providing a mixture of precipitation for much of the eastern third of the country. Severe thunderstorms battered the Southeast, dropping large hail and spawning over a dozen tornadoes from Florida to North Carolina. Heavy rains from the storms fell on top of already-saturated ground, producing major flooding in southern Georgia and northern Florida. Farther north, freezing rain coated exposed surfaces with an inch of ice from northern Ohio to Maine, downing tress and powerlines and severing electrical service to as many as 340,000 residents in Ohio and New York. In sharp contrast, unseasonably warm conditions prevailed across the Great Plains and the southern half of Florida as numerous daily record highs were established. Mid-week readings exceeded 100°F in southern Texas while nineties were common in the southern Great Plains (Figure 2).

A variety of seasons were found across the eastern half of the country during the first half of the week. Violent, spring-like thunderstorms pounded the Southeast, wintry weather gripped the Northeast and lower Great Lakes, and temperatures more typical of August sizzled the southern Great Plains. In the Southeast, intense thunderstorms damaged trees, powerlines, and buildings across portions of Georgia and Florida while up to 3 inches of rain fell on top of already-saturated ground, causing major flooding in some areas. Farther north, freezing rain downed trees and powerlines and contributed to two major multi-vehicle accidents in southern Michigan. Farther west, another storm system pushed into the central Pacific Coast. Heavy rains fell from coastal Washington to the lower elevations across interior central California while heavy snow covered the higher elevations. Strong winds associated with the storm system gusted to over 100 mph in the eastern slopes of the Sierra Nevadas. The storm eventually tracked into the the northern Plains, dumping over two feet of snow across portions of the northern and central Rockies. In sharp contrast, spring-like warmth preceded the storm system across the northern and central Plains while summer-like heat overspread much of Texas as readings soared into the nineties and one hundreds by mid-week.

During the latter half of the week, the storm in the northern Plains pushed rapidly eastward while its associated cold front rushed southeastward across the central Plains. Temperatures behind the front lowered to seasonable levels, but record heat persisted across the southern Plains until late Thursday. San Antonio, TX reached 100°F on Wednesday, the highest temperature ever recorded during the winter, and Laredo soared to 105°F. The storm system and trailing cold front pushed into the eastern U.S. towards the weekend, spreading snow to parts of the Great Lakes, New England, and southern Appalachians. Farther south, unseasonably warm conditions prevailed over central and southern Florida as the front stalled over the Southeast. To the west, a dome of high pressure provided dry weather from the Plains to the Far West. In Hawaii, heavy rains fell on the eastern side of the island, causing some minor flooding.

According to the River Forecast Centers, the greatest weekly totals (more than 3 inches) were found along the coasts of Oregon and central California, across most of the Cascades and Sierra Nevadas, and in portions of the central Rockies, central and southern Piedmonts, southern Georgia, and central Florida (Table 1). Light to moderate amounts fell throughout the remainder of the eastern third of the country, upper Midwest, the Rockies, across most of the Far West, Hawaii, and much of Alaska. Little or no precipitation was observed in the desert Southwest, Plains, and the lower and middle Mississippi Valley.

Unseasonable warmth was evident over a large part of the nation. In the lower 48 states, the greatest departures (between +7°F and +10°F) occurred in the Great Plains and southern New England. Elsewhere, milder than normal conditions covered portions of the Far West and most of the Rockies, Plains, Midwest, Gulf Coast states, and Atlantic Seaboard. Farther north, unusually mild weather persisted across most of Alaska for the second successive week, with departures up to +12°F at Northway (Table 2).

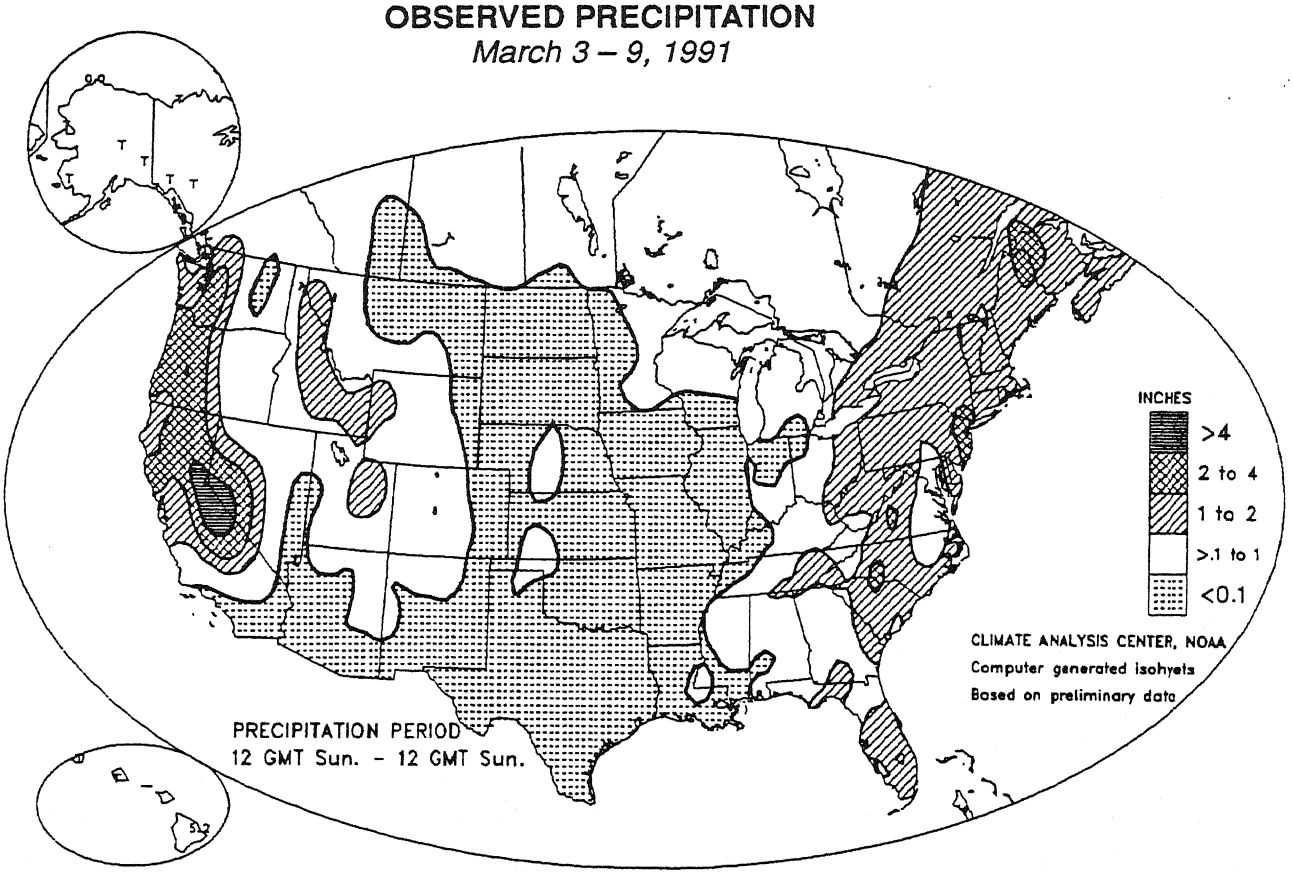
In contrast, negative weekly departures were confined to only a few small areas in the contiguous U.S. and Alaska as Arctic air remained perched over south-central Canada. Slightly below normal temperatures were observed in the central Appalachians, Tennessee and lower Ohio Valleys, parts of the Great Basin and northern California, along the Pacific Northwest Coast, and in extreme southeastern Alaska (Table 3). In Hawaii, however, unseasonably cool conditions persisted for the second consecutive week where weekly departures reached -2°F.

TABLE 1. Selected stations with 2.50 or more inches of precipitation for the week.

STATION	TOTAL (INCHES)	STATION	TOTAL (INCHES)
BLUE CANYON, CA	7.67	VALDOSTA/MOODY AFB, GA	3.06
HILO/LYMAN, HAWAII, HI	5.23	TALLAHASSEE, FL	2.92
EUGENE, OR	4.62	FALMOUTH/OTIS AFB, MA	2.73
AUGUSTA, GA	3.75	HOULTON, ME	2.62
VERO BEACH, FL	3.29	YAKUTAT, AK	2.60
POUGHKEEPSIE, NY	3.26	MILLVILLE, NJ	2.57
CAPE HATTERAS, NC	3.15	LIMESTONE/LORING AFB, ME	2.55
CHARLOTTE, NC	3.11	HOMESTEAD AFB, FL	2.54
NEWARK, NJ	3.06	GREENSBORO, NC	2.51

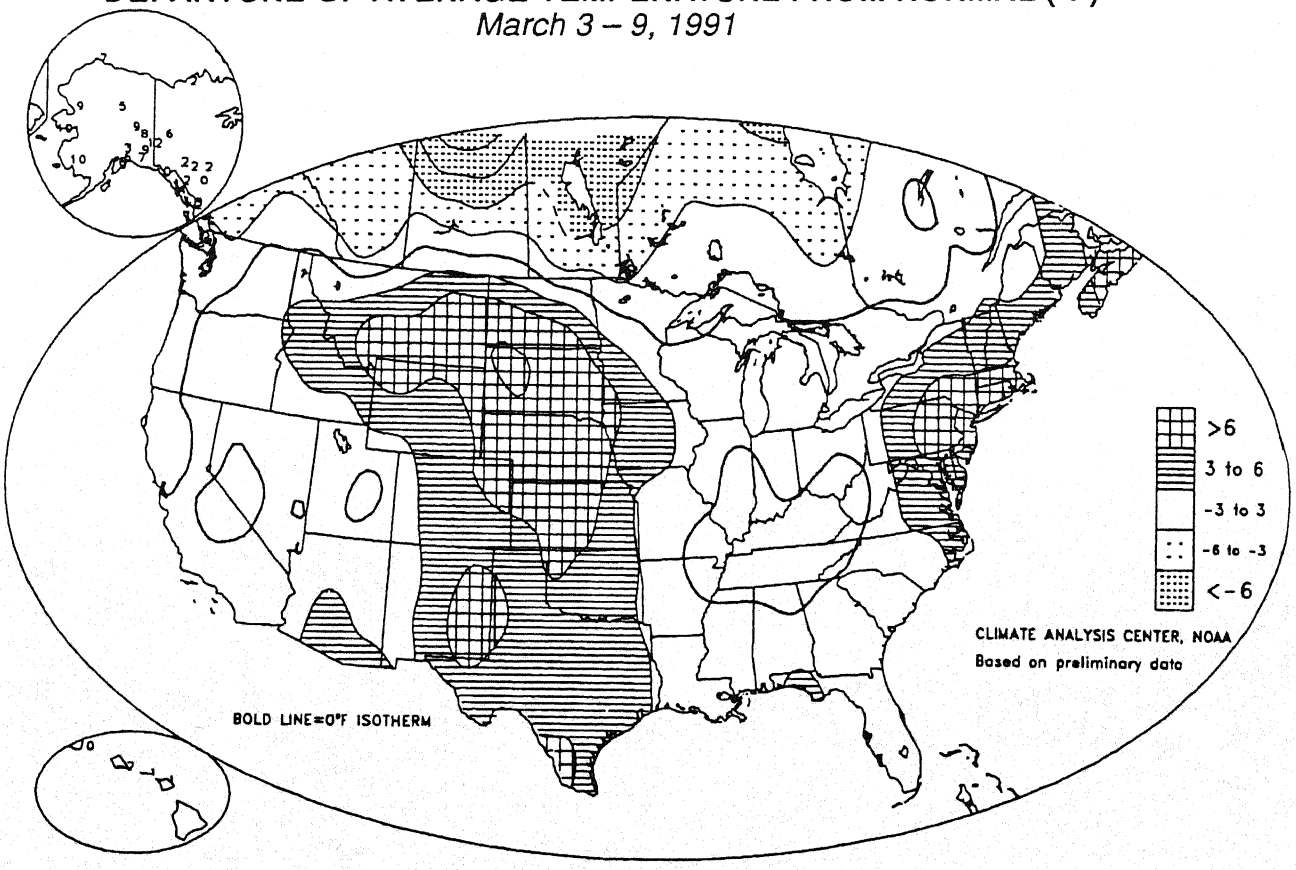
OBSERVED PRECIPITATION

March 3 – 9, 1991



DEPARTURE OF AVERAGE TEMPERATURE FROM NORMAL (°F)

March 3 – 9, 1991



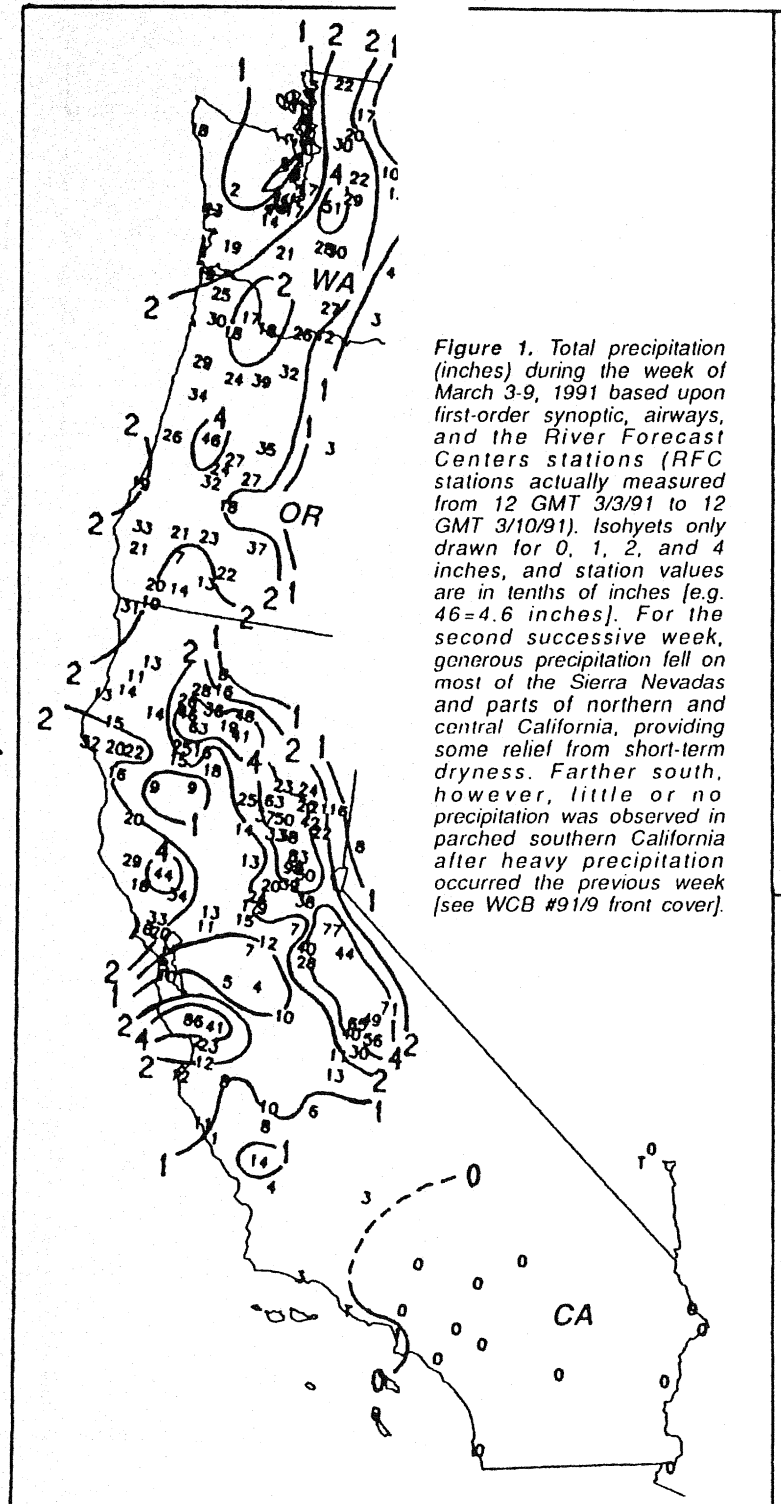


Figure 1. Total precipitation (inches) during the week of March 3-9, 1991 based upon first-order synoptic, airways, and the River Forecast Centers stations (RFC stations actually measured from 12 GMT 3/3/91 to 12 GMT 3/10/91). Isohyets only drawn for 0, 1, 2, and 4 inches, and station values are in tenths of inches [e.g. 46=4.6 inches]. For the second successive week, generous precipitation fell on most of the Sierra Nevadas and parts of northern and central California, providing some relief from short-term dryness. Farther south, however, little or no precipitation was observed in parched southern California after heavy precipitation occurred the previous week [see WCB #91/9 front cover].

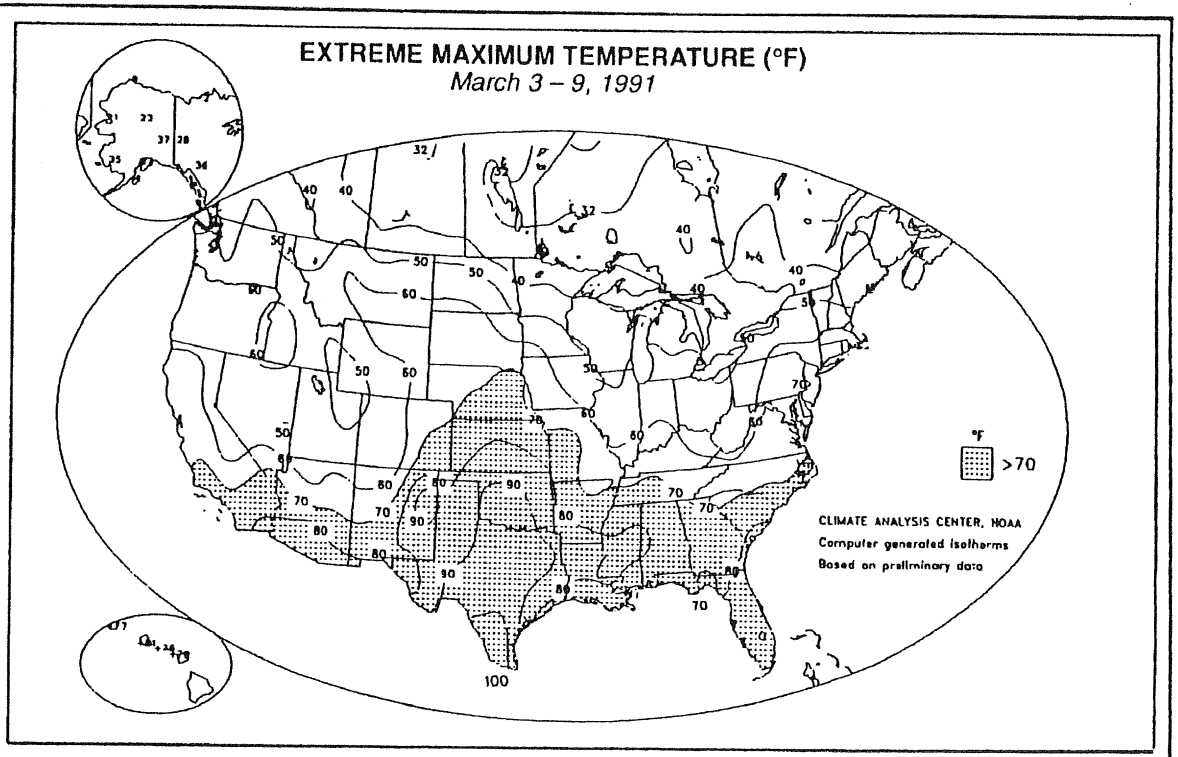


Figure 2. Extreme maximum temperatures (°F) during the week of March 3-9, 1991. Summer-like warmth covered the southern Plains around mid-week as readings soared into the nineties, and even into the lower one hundreds in extreme southern Texas. San Antonio, TX rose to 100°F on March 6, only the second time on record that the thermometer hit triple-digits during March, and the highest temperature ever during the winter season [Dec. 21-Mar. 20] and for so early in the year.

TABLE 2. Selected stations with temperatures averaging 8.0°F or more ABOVE normal for the week.

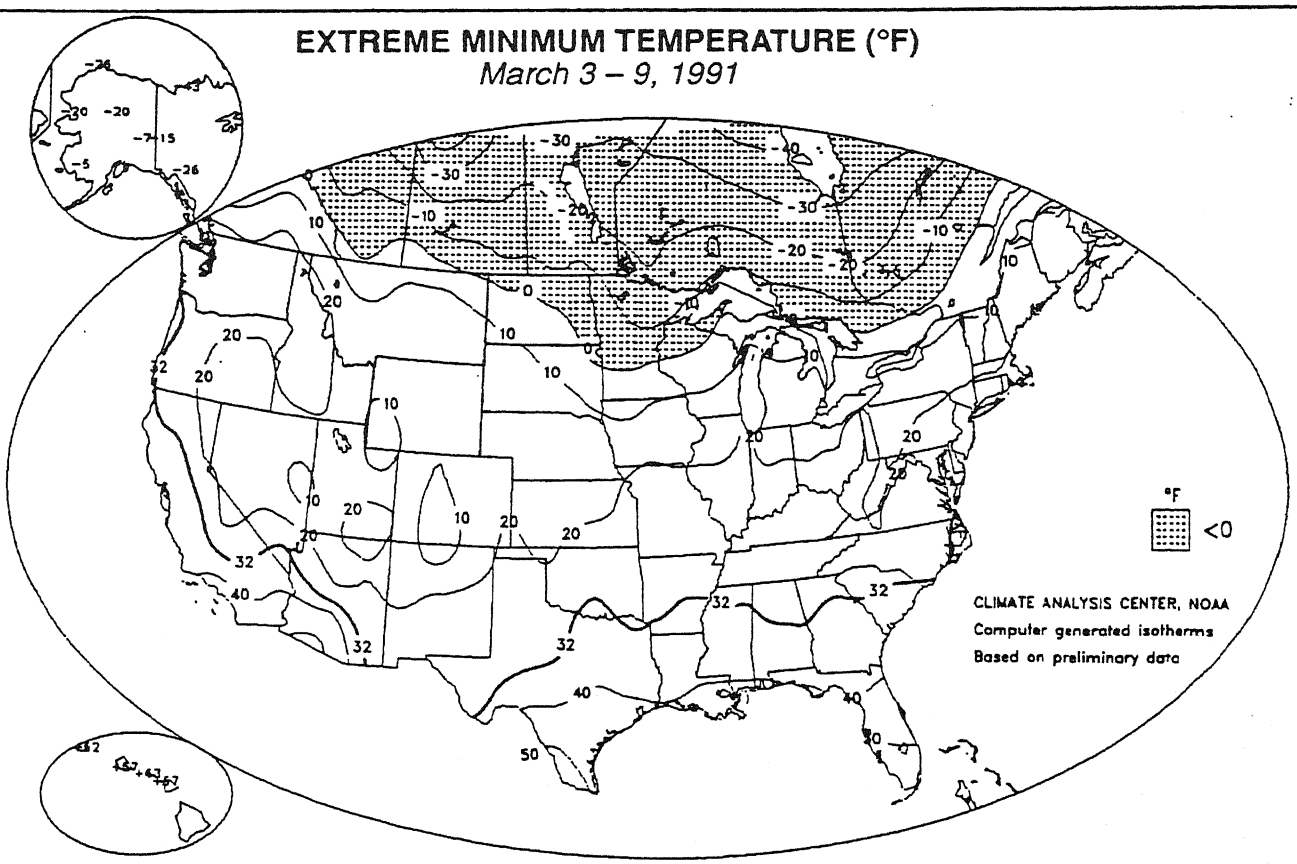
STATION	DEPARTURE (°F)	AVERAGE (°F)	STATION	DEPARTURE (°F)	AVERAGE (°F)
NORTHWAY, AK	+12.2	12.5	BIG DELTA, AK	+8.8	16.1
MCGRATH, AK	+11.4	15.4	BISMARCK, ND	+8.7	30.3
KING SALMON, AK	+10.4	27.1	RAPID CITY, SD	+8.6	38.2
BETHEL, AK	+10.3	18.7	SIDNEY, NE	+8.5	39.6
NOME, AK	+10.3	14.9	VALENTINE, NE	+8.4	37.1
MILES CITY, MT	+9.9	37.5	LINCOLN, NE	+8.3	40.5
FAIRBANKS, AK	+9.9	12.9	CLOVIS/CANNON AFB, NM	+8.2	52.2
NORFOLK, NE	+9.6	39.1	RUSSELL, KS	+8.2	45.2
ROSWELL, NM	+9.4	57.7	GRAND ISLAND, NE	+8.2	40.4
KOTZEBUE, AK	+9.3	6.4	ABERDEEN, SD	+8.2	30.9
DICKINSON, ND	+9.2	32.0	ISLIP, NY	+8.1	43.3
NORTH PLATTE, NE	+9.1	40.5	ALLENTOWN, PA	+8.1	43.1
BOZEMAN, MT	+8.9	33.4	BRIDGEPORT, CT	+8.0	43.2
HURON, SD	+8.8	33.7			

TABLE 3. Selected stations with temperatures averaging 2.0°F or more BELOW normal for the week.

STATION	DEPARTURE (°F)	AVERAGE (°F)	STATION	DEPARTURE (°F)	AVERAGE (°F)
CHAMPAIGN, IL	-3.0	33.1	CHARLESTON, WV	-2.2	39.2
QUILLAYUTE, WA	-2.9	39.4	JACKSON, KY	-2.2	39.8
BLYTHEVILLE AFB, AR	-2.8	45.1	NORTH BEND, OR	-2.2	44.6
DULUTH, MN	-2.6	16.6	JONESBORO, AR	-2.2	46.1
SEXTON SUMMIT, OR	-2.5	34.5	HONOLULU, OAHU, HI	-2.2	71.1
GAINESVILLE, FL	-2.5	60.1	OLYMPIA, WA	-2.1	39.8
POPLAR BLUFF, MO	-2.3	42.6	HUNTINGTON, WV	-2.0	39.8
REDDING, CA	-2.3	50.7			

EXTREME MINIMUM TEMPERATURE (°F)

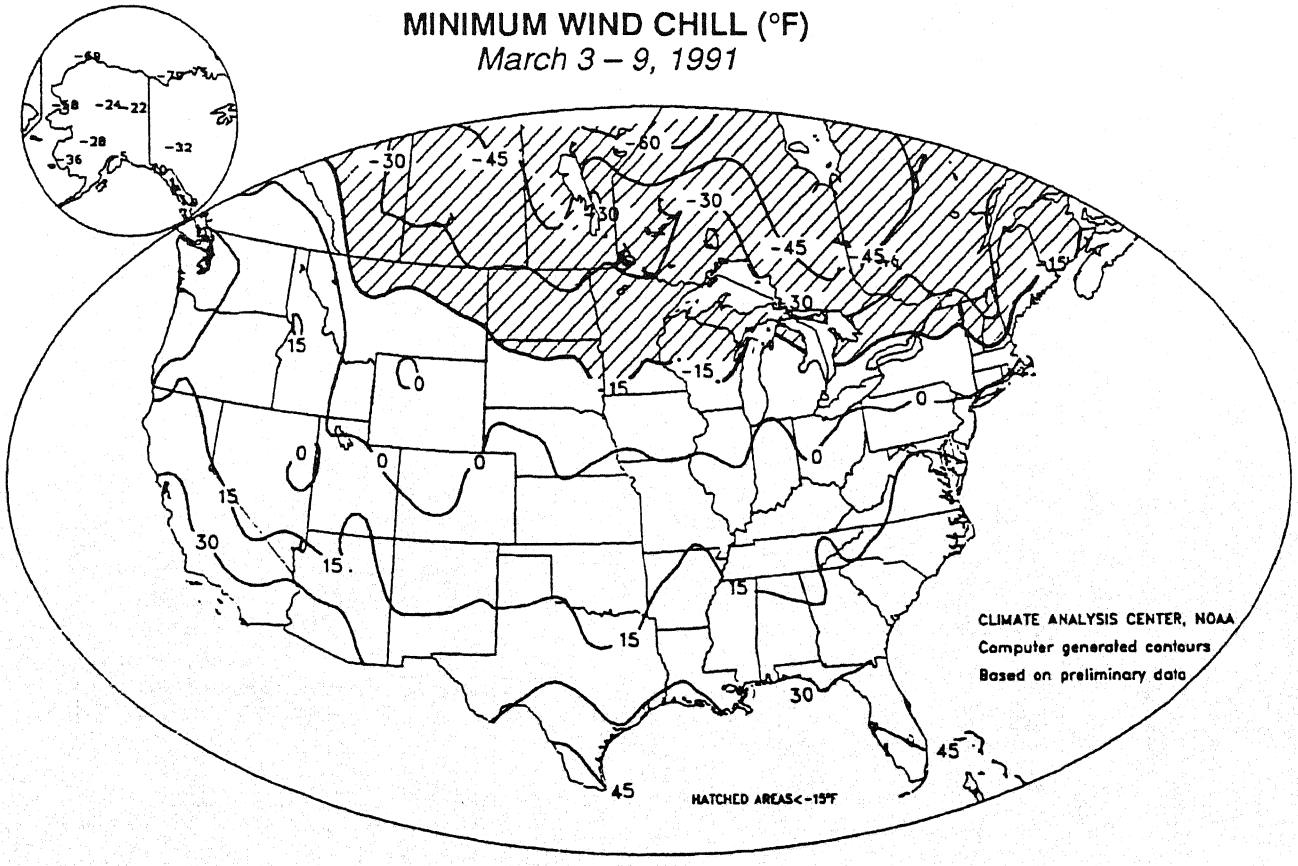
March 3 – 9, 1991



With much of the nation experiencing near to above normal conditions last week, subzero readings were restricted to the upper Midwest while subfreezing temperatures only reached the northern portions of the Gulf Coast states (top). Gusty winds and cold weather late in the week produced subzero wind chills across most of the upper–third of the nation; however, dangerous wind chills (<–15°F) were confined from the northern Plains eastward into northern New England (bottom).

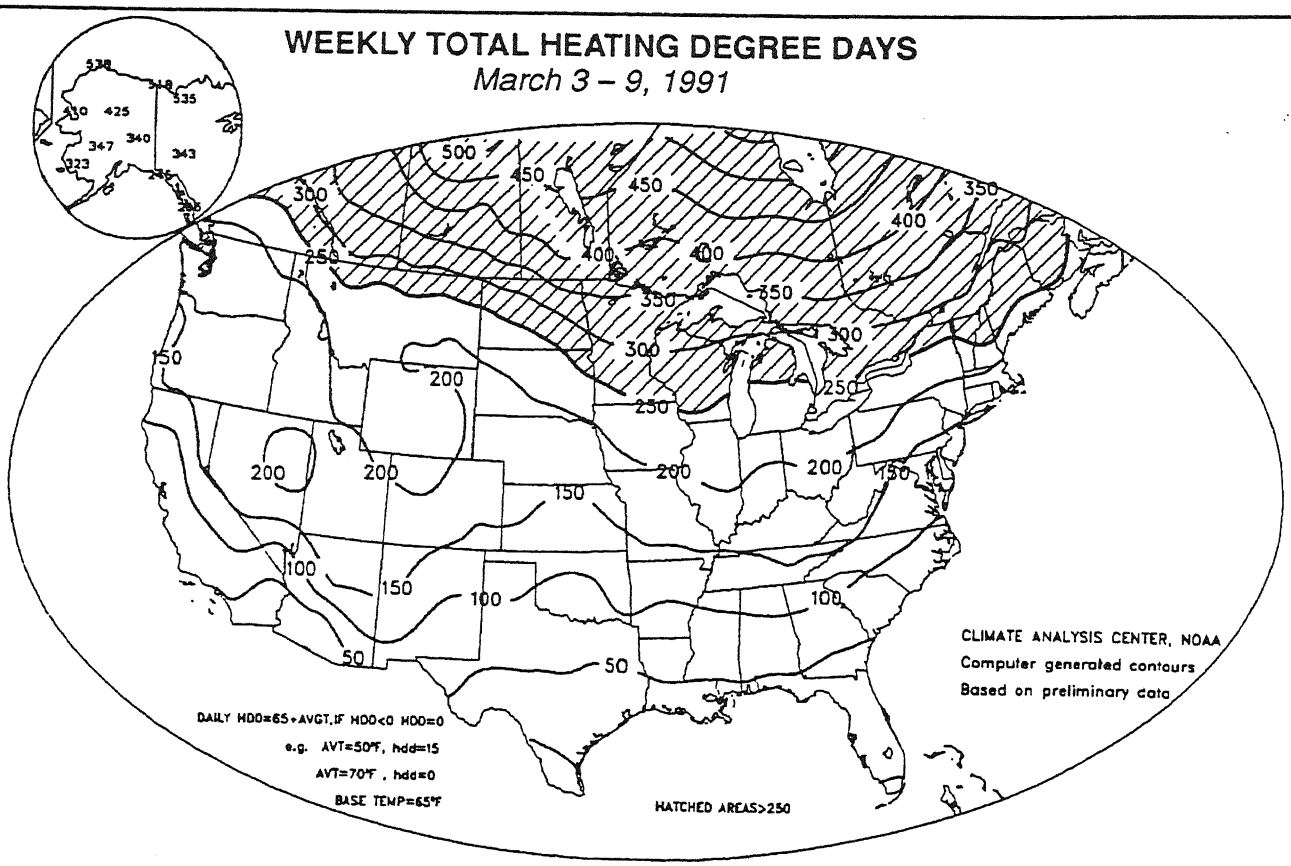
MINIMUM WIND CHILL (°F)

March 3 – 9, 1991



WEEKLY TOTAL HEATING DEGREE DAYS

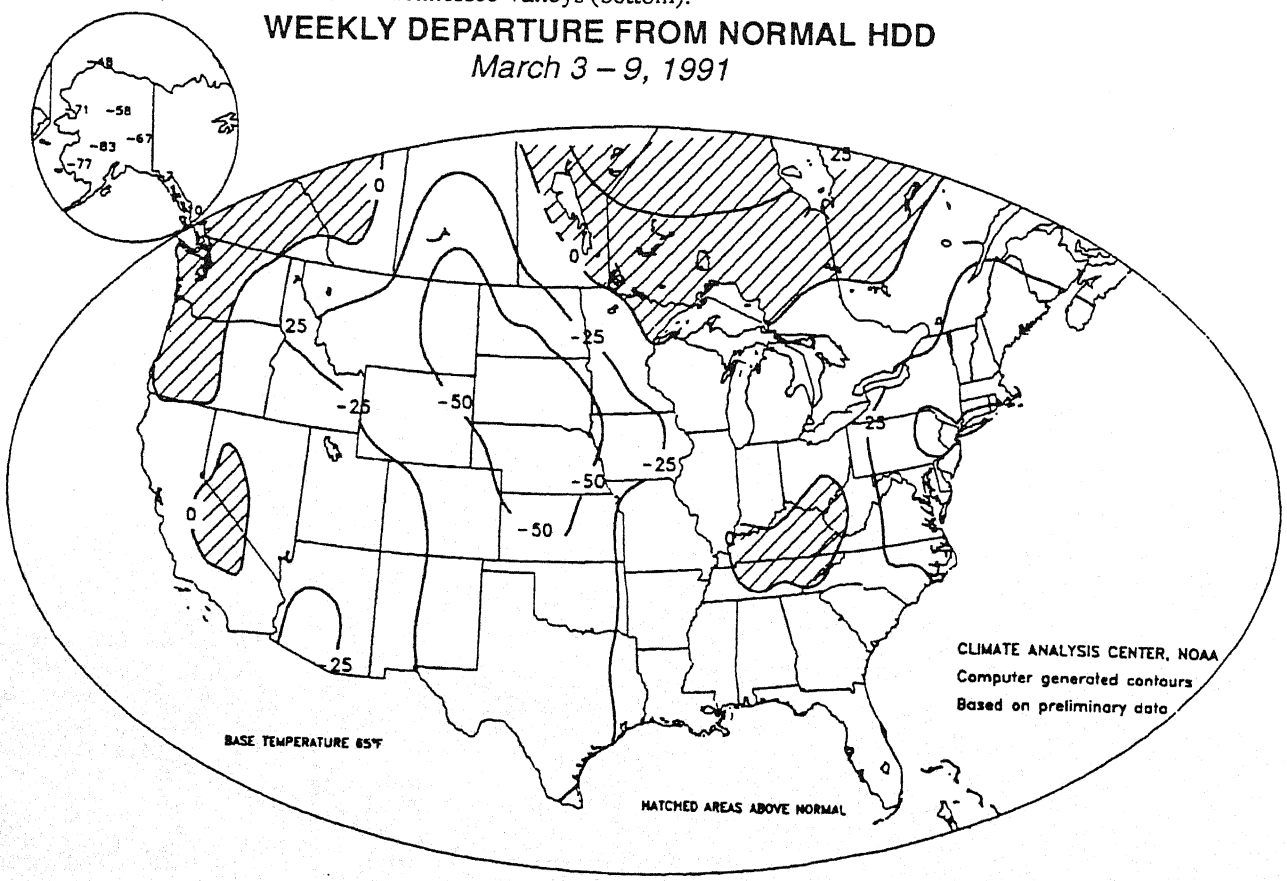
March 3 – 9, 1991



Even though temperatures averaged slightly above normal, heating usage across the northern Plains, upper Midwest, and northern New England was still above 250 HDD's due to typically large March heating requirements in the region (top). Milder than usual weather produced subnormal heating demand throughout most of the lower 48 states and Alaska with the exception of the Pacific Northwest, western Great Basin, and lower Ohio and Tennessee Valleys (bottom).

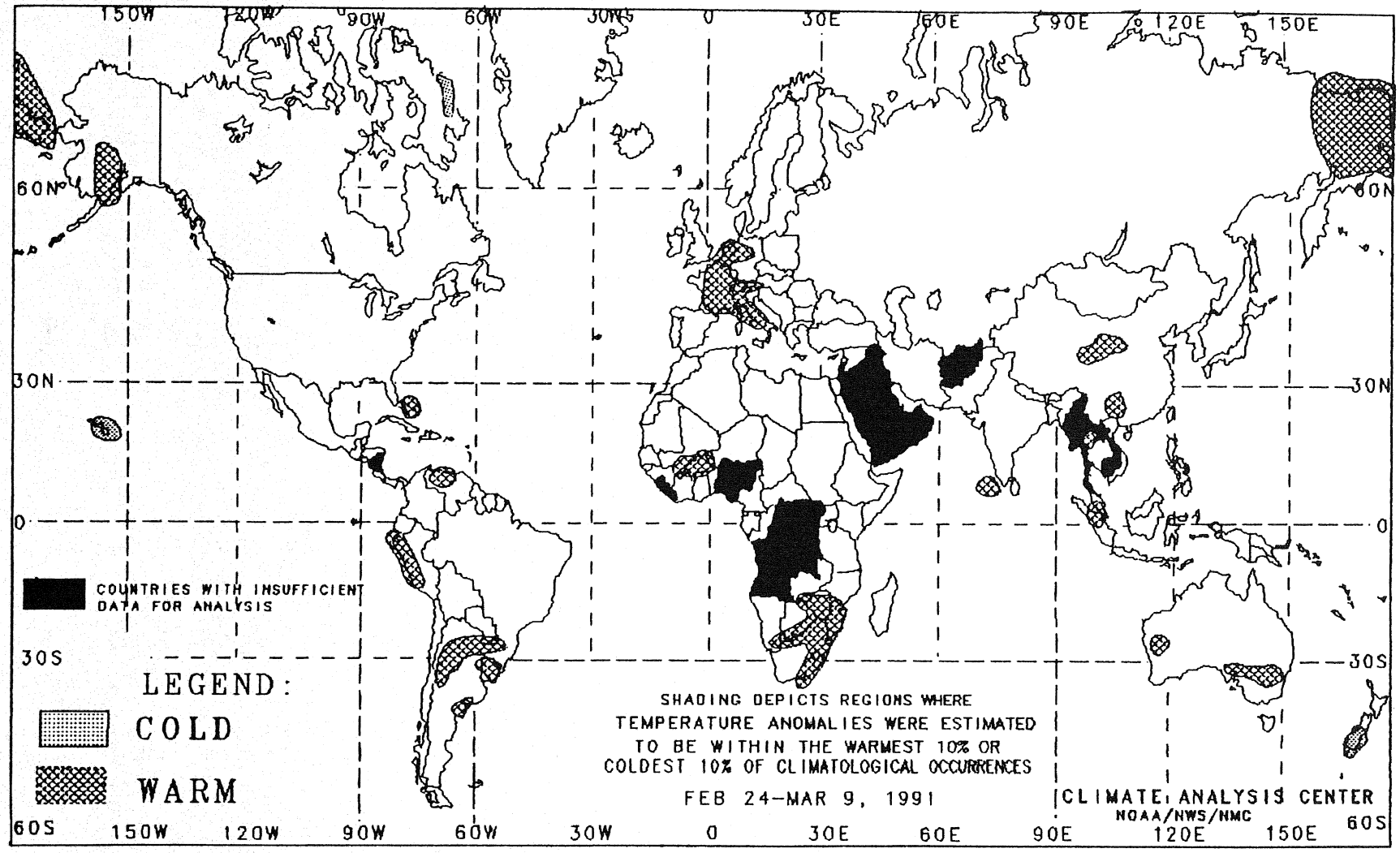
WEEKLY DEPARTURE FROM NORMAL HDD

March 3 – 9, 1991



GLOBAL TEMPERATURE ANOMALIES

2 WEEKS



The anomalies on this chart are based on approximately 2500 observing stations for which at least 13 days of temperature observations were received from synoptic reports. Many stations do not operate on a twenty–four hour basis so many night time observations are not taken. As a result of these missing observations the estimated minimum temperature may have a warm bias. This in turn may have resulted in an overestimation of the extent of some warm anomalies.

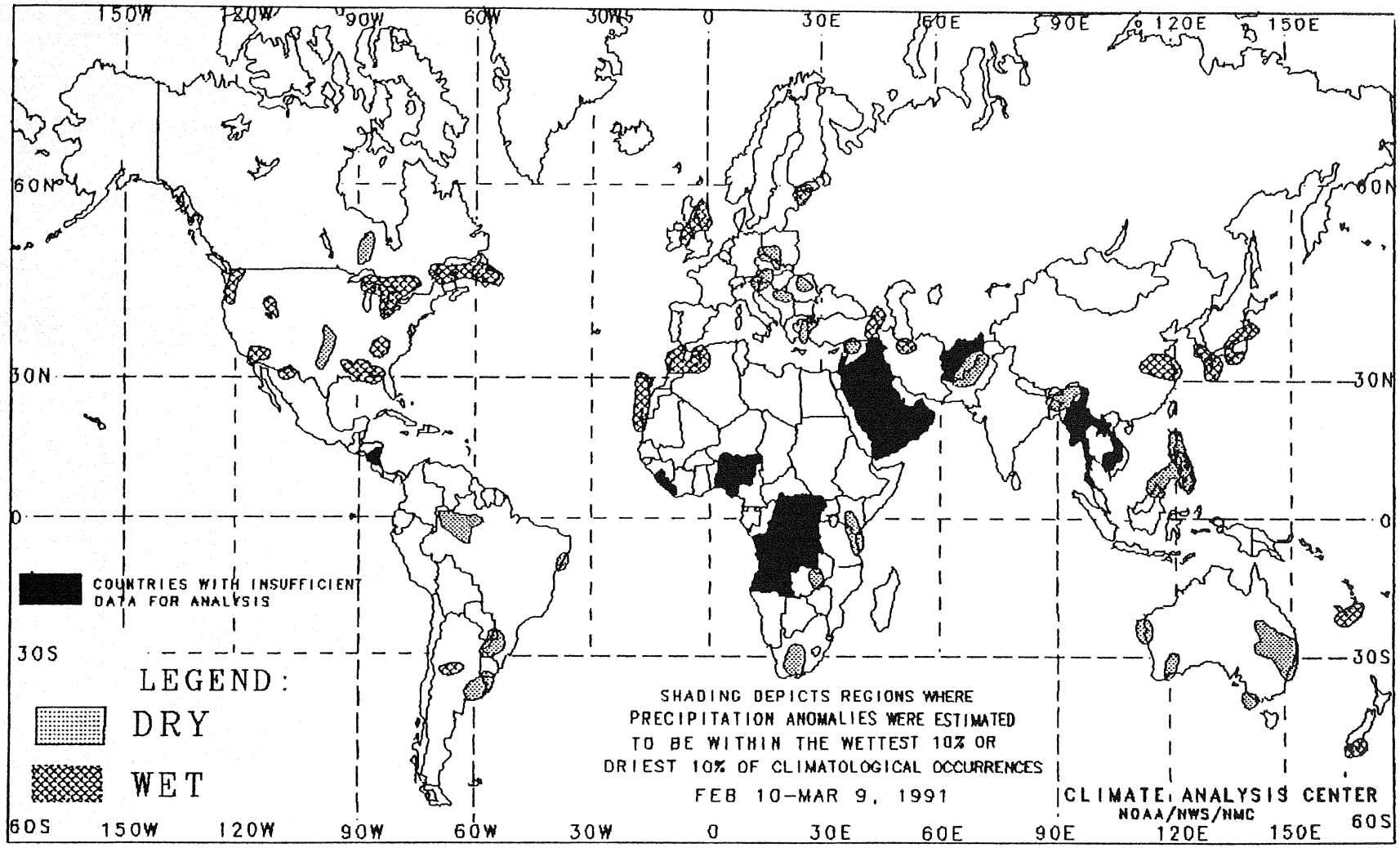
Temperature anomalies are not depicted unless the magnitude of temperature

In some regions, insufficient data exist to determine the magnitude of anomalies. These regions are located in parts of tropical Africa, southwestern Asia, interior equatorial South America, and along the Arctic Coast. Either current data are too sparse or incomplete for analysis, or historical data are insufficient for determining percentiles, or both. No attempt has been made to estimate the magnitude of anomalies in such regions.

This chart shows general areas of two week temperature anomalies. Caution must

GLOBAL PRECIPITATION ANOMALIES

4 WEEKS



The anomalies on this chart are based on approximately 2500 observing stations for which at least 27 days of precipitation observations (including zero amounts) were received or estimated from synoptic reports. As a result of both missing observations and the use of estimates from synoptic reports (which are conservative), a dry bias in the total precipitation amount may exist for some stations used in this analysis. This in turn may have resulted in an overestimation of the extent of some dry anomalies.

In climatologically arid regions where normal precipitation for the four week period is less than 20 mm, dry anomalies are not depicted. Additionally, wet anomalies for such arid regions are not depicted unless the total four week precipitation exceeds 50 mm.

In some regions, insufficient data exist to determine the magnitude of anomalies. These regions are located in parts of tropical Africa, southwestern Asia, interior equatorial South America, and along the Arctic Coast. Either current data are too sparse or incomplete for analysis, or historical data are insufficient for determining percentiles, or both. No attempt has been made to estimate the magnitude of anomalies in such regions.

The chart shows general areas of four week precipitation anomalies. Caution must be used in relating it to local conditions, especially in mountainous regions.

UNITED STATES MONTHLY CLIMATE SUMMARY

FEBRUARY 1991

Through the first 26 days of February, it appeared as though this year's rainy season (since October) would be highlighted by record dryness; however, powerful Pacific storms swept into the area at the end of the month, drenching much of drought–stricken California with heavy precipitation. Amounts were abnormally large in central Arizona and southern California, where over a foot of rain inundated portions of the San Gabriel and Laguna Mountains and 4 inches soaked the parched Los Angeles Basin. Although providing short–term relief, the precipitation was not even close to alleviating long–term deficits as mandatory water restrictions continued in California. Despite the welcome rains, October 1990–February 1991 precipitation in California was still ranked as the third driest on record [Figure 7]. Beneficial heavy snow also brought badly–need moisture to the Dakotas while torrential rains pounded eastern Texas, Louisiana, and Mississippi for the second consecutive month, producing severe flooding. Farther east, however, dry conditions returned to most of the middle and southern Atlantic Coast states and continued in New England where less than 75% of the normal monthly precipitation fell. The driest February ever in Savannah, GA followed the wettest January on record. The remainder of the country also recorded subnormal precipitation, especially in the nation's midsection, where no measurable precipitation occurred in southern Kansas, western Oklahoma, the Texas Panhandle, and northeastern New Mexico [Figure 2, Table 5]. As a result, this was the second driest February during the past 97 years nationally.

Spring–like warmth prevailed nationwide during the first ten days of the month as over 175 daily record highs were set. Colder air, however, filtered into the East around mid–month. The lowest readings of the Winter dipped into the Southeast where 30 daily minimum temperature records were broken on Feb. 16. Temperatures plunged into the lower twenties in northern Florida and to freezing in central sections. Unseasonable warmth, however, returned during the remainder of the month as temperatures averaged much above normal across the contiguous United States. Overall, the were more than 270 daily record highs during the month, and several locations reported the highest average February temperature [Table 6]. The greatest monthly departures occurred in the upper Missouri Valley as temperatures averaged over 16°F above normal in eastern Montana [Figure 5]. Six of the nine regions had one of the ten warmest Februarys on record (warmest in the Northwest), leading to the third warmest February across the lower 48 states since 1895.

The month commenced with spring–like warmth prevailing over most of the country. Temperatures averaged more than 30°F above normal in North Dakota during the first week while several stations in Michigan and Pennsylvania shattered daily record highs by more than 15°F. Early February precipitation in northern California abated as a ridge of high pressure returned the the region, keeping the West unseasonably warm and dry. Farther east, a storm system dumped locally heavy rains on eastern Texas northeastward into the Ohio Valley, and a subsequent system drenched the Tennessee Valley with over 2 inches. The coldest air of the season spilled into the East behind the first system as freezing temperatures reached into central Florida.

By mid–month, a strong winter storm blanketed the northern and central Rockies, northern Plains, and upper Great Lakes with heavy snow as accumulations totaled 18 inches in central South Dakota. Meanwhile, incessant rains soaked the Tennessee and lower Mississippi Valleys with up to 12 inches, flooding parts of southern Arkansas, northern sections of Louisiana, Mississippi, and Alabama, and central Tennessee. The Tombigbee River crested at more than 20 feet above flood stage in Gainesville, AL. At the month's end, an intense storm lashed California with heavy precipitation and severe weather which included two tornadoes. Rainfall totaled between 2 and 4 inches along the coast from San Francisco southward, causing widespread urban flooding. The storm also added more than 2 feet to the feeble snowpack in the Sierra Nevadas and similar amounts to the mountains of Arizona, including 31.5 inches in Flagstaff.

According to the River Forecast Centers, the greatest monthly precipitation (more than 10 inches) was reported in northeastern Louisiana, southeastern Arkansas, northern Mississippi and Alabama, south–central Tennessee, and along coastal Washington and in the northern Cascades [Table 1, Figures 2 and 3]. Heavy rainfall was unofficially reported in the mountains northeast of San Diego, CA at Cuyamacho Rancho Park (13.50 inches) and Julian (12.72 inches). In addition to the excessive wetness from eastern Texas northeastward into the Ohio Valley, above normal precipitation also occurred in portions of California and the Southwest due to the month–ending storm, and across western Washington and the northern Great Plains and upper Midwest. In Alaska, surplus February precipitation was limited to southeastern sections of the state.

Anomalously dry weather dominated the remainder of the contiguous United States as the month ranked as the second driest February on record. Portions of the country receiving less than 75% of the normal precipitation included most of the Atlantic Seaboard (following a generally wet January), eastern Great Lakes, central and western Corn Belt, central and southern Plains, Rockies, Intermountain West, and Pacific Coast states [Table 2, Figures 2 and 3]. Most of the nine regions were ranked in the lower (dry) third of the historic precipitation distribution, with the Northeast and West–North Central observing the sixth and tenth driest February ever. During the first two months of 1991, several states have been extremely dry, with 13 recording one of the ten driest January–February periods since 1895. This has resulted in the sixth driest such period nationally [page 12].

With the exception of a few locations, temperatures averaged above normal over the entire contiguous United States. The largest positive departures occurred in the northern Rockies and Plains where temperatures averaged between 10°F and 16°F above normal [Table 3, Figure 5]. The warmth was also climatologically significant (>70th percentile) throughout much of the country and near record levels (>90th percentile) in the Far West and Plains [Figure 4]. Regionally, the Northwest and West–North Central had the first and second warmest February on record, respectively, with the remaining regions ranking well in the upper (warm) third of the historic distribution. In Alaska and Hawaii, slightly warmer than usual conditions occurred across much of both states.

Subnormal February temperatures were limited to a handful of stations, with the majority of them located in southwestern Alaska and the Aleutians [Table 4, Figure 5]. A brief shot of mid–month Arctic air into the lower 48 states, particularly in the East, could not compensate for exceptionally mild weather early and late in the month. As a result, nearly every location in the contiguous U.S. was above normal during February [Figure 5].

TEMPERATURE AND PRECIPITATION RANKINGS FOR FEBRUARY 1991, BASED ON THE PERIOD 1895 TO 1990. 1 = DRIEST/COLDEST AND 97 = WETTEST/HOTTEST.

REGION	*PRECIPITATION*	*TEMPERATURE*
NORTHEAST	6	90
EAST NORTH CENTRAL	20	90
CENTRAL	48	80
SOUTHEAST	14	76
WEST NORTH CENTRAL	10	96
SOUTH	35	86
SOUTHWEST	22	88
NORTHWEST	19	97
WEST	48	95
NATIONAL	2	95

National Climatic Data Center

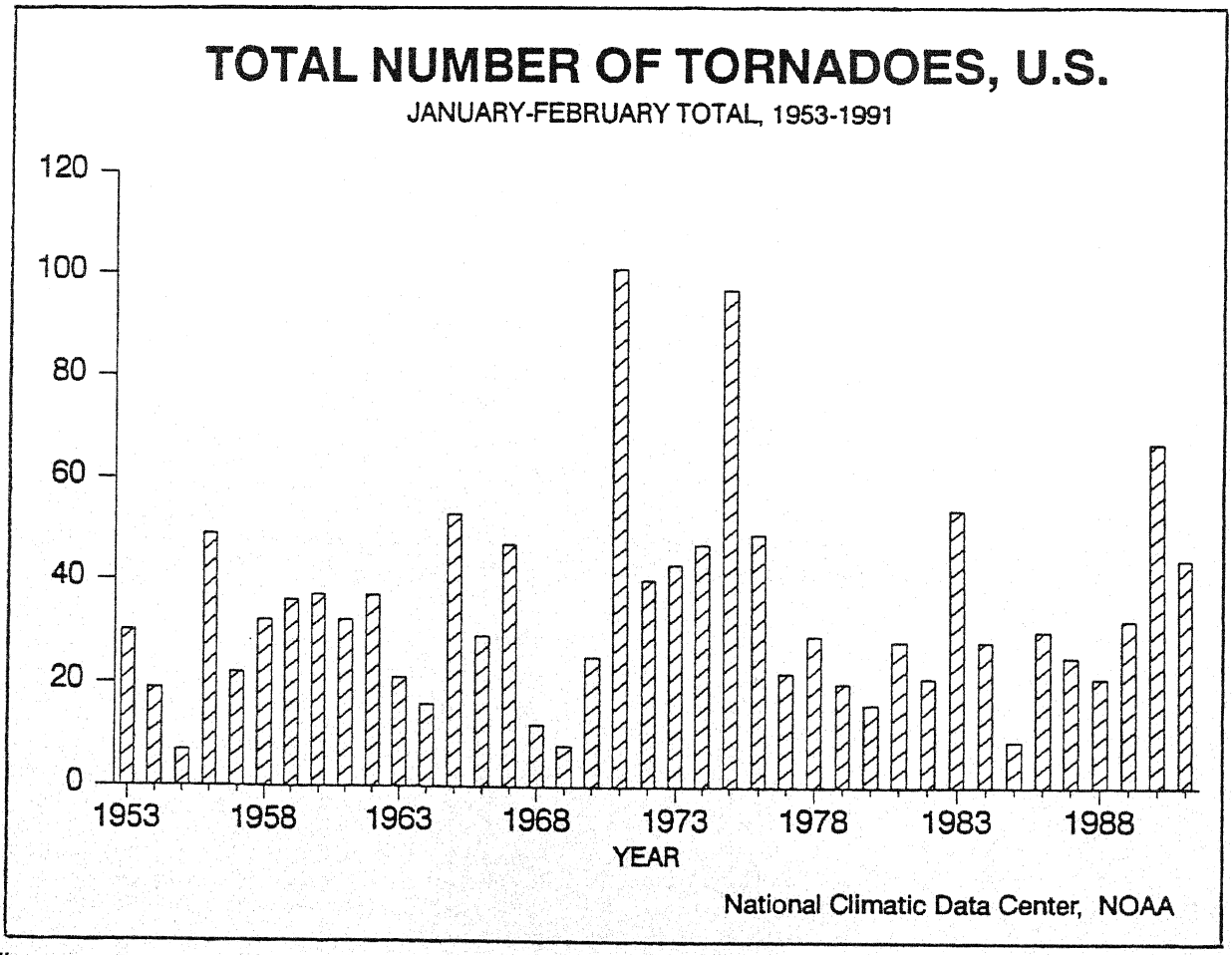
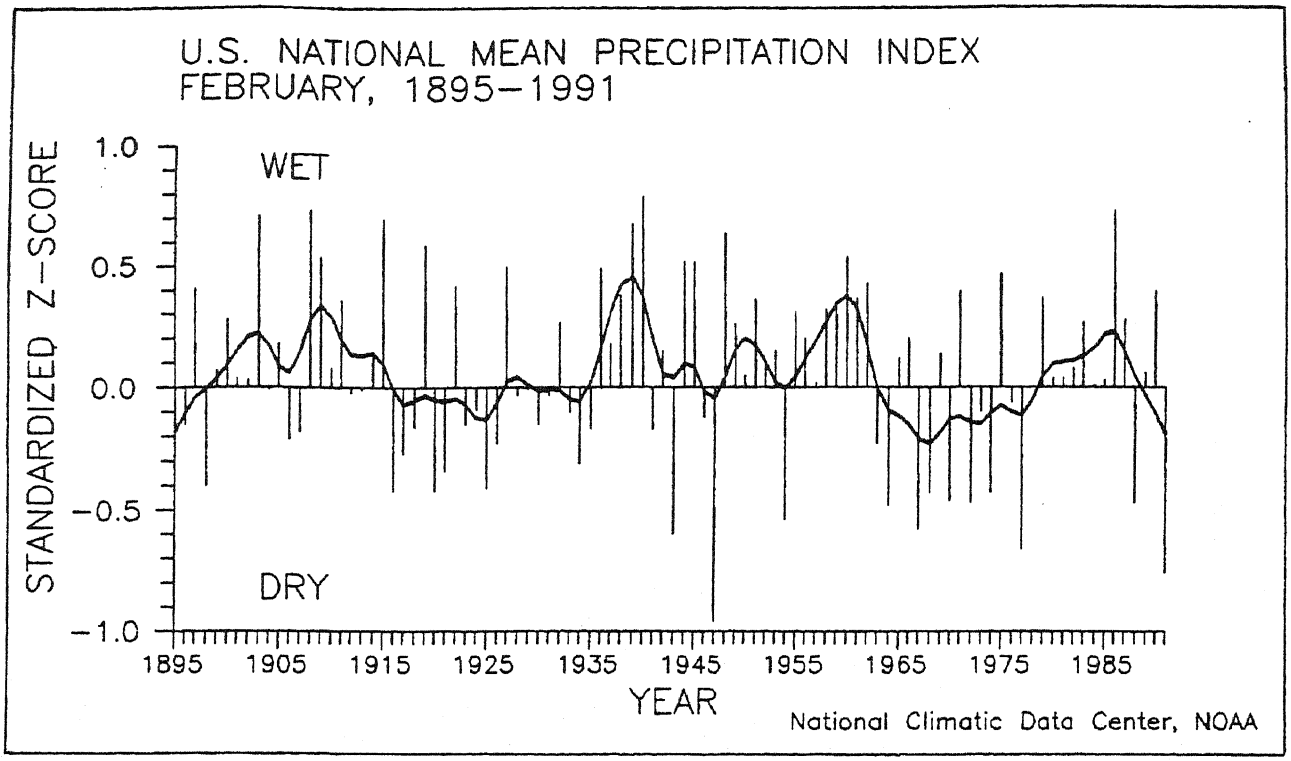
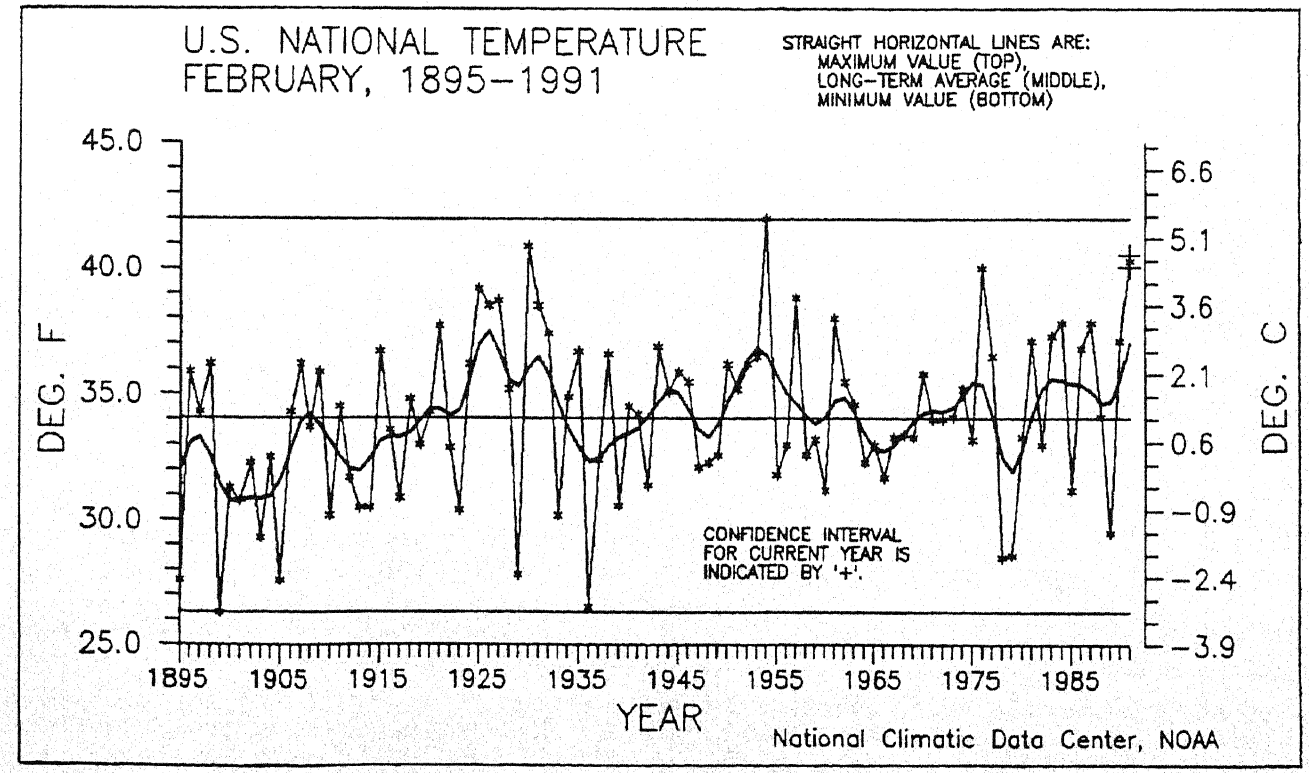


Figure 1. Total number of tornadoes in the contiguous U.S., January-February, 1953-1991. With such an extremely dry February [2nd driest February on record], there were relatively few intense thunderstorms (in addition to precipitation) across the lower 48 states. As a result, only 7 tornadoes were reported during the month, well below the 37-year February average of 21; however, an active January brought the January-February total to 44, which is above the 1953-1990 average of 34.



U.S. National February 1991 mean precipitation index (top) and temperature (bottom). The monthly precipitation for each climate division in the country (total of 344) was first standardized over the 1951-1980 period, then weighed by area and averaged to determine a national standardized precipitation value. Negative (positive) values are dry (wet). Based upon the index, the **February 1991 precipitation was WELL BELOW the long-term mean** (the 2nd driest February during the past 97 years). With subnormal monthly precipitation occuring along the Eastern Seaboard, in the Far West, and throughout much of the nation's midsection, it was not surprising that 6 of the 9 regions were in the lower (dry) third of the historic February precipitation distribution and the other 3 were in the middle third. The few areas with significant monthly precipitation (>150% of normal) were the upper Midwest and northern Great Plains, extreme southern California and Arizona, and parts of the Deep South and Tennessee Valley.



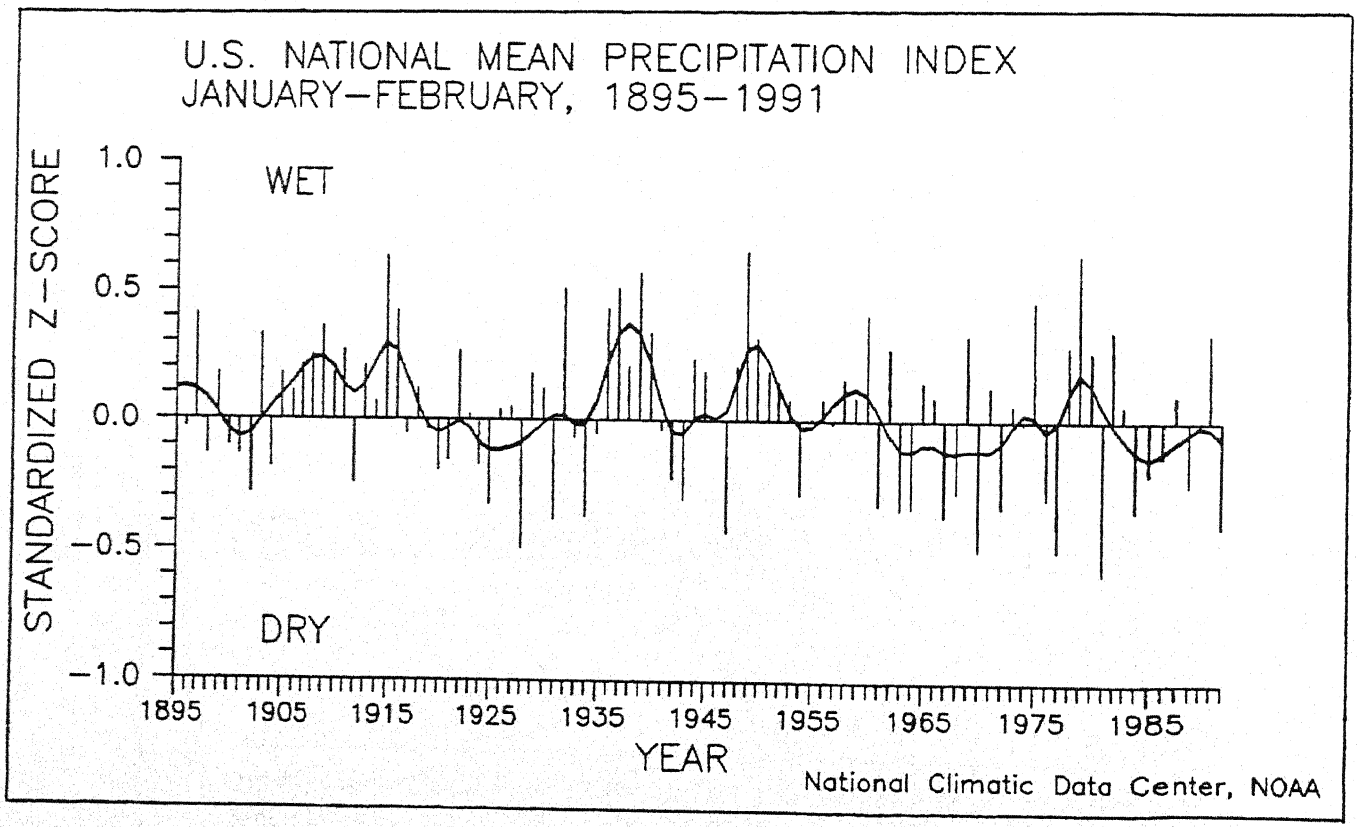
Across the contiguous U.S., **February 1991 temperatures averaged WELL ABOVE the long-term mean**, ranking as the 3rd warmest February since 1895 (97 years). Nearly all locations in the lower 48 states observed above normal monthly temperatures as Arctic air intrusions were short-lived and far apart. Dry and sunny weather in the Far West also promoted milder than usual conditions. As a result, all the regions were ranked in the upper (warm) third of the long-term temperature distribution, with the Northwest [1st], West-North Central [2nd], West [3rd], Northeast [8th], East-North Central [8th], and Southwest [10th] observing one of the ten warmest Februarys since 1895.

PRECIPITATION RANKINGS FOR JAN–FEB 1991, BASED ON THE PERIOD 1895 TO 1990. 1 = DRIEST, 97 = WETTEST.

STATE	RANK	STATE	RANK	STATE	RANK	STATE	RANK
AL	76	*IA*	*9*	NE	24	RI	31
AZ	42	*KS*	*8*	*NV*	*8*	SC	55
AR	19	KY	55	*NH*	*10*	SD	51
CA	15	**LA**	**93**	NJ	26	TN	60
CO	29	ME	12	NM	48	TX	87
CT	*10*	MD	25	NY	27	UT	20
DE	46	MA	17	NC	50	*VT*	*4*
FL	**92**	*MI*	*7*	ND	33	VA	23
GA	**91**	MN	44	OH	33	WA	19
ID	*5*	**MS**	**89**	*OK*	*10*	WV	39
IL	*9*	MO	19	*OR*	*4*	WI	17
IN	28	*MT*	*9*	PA	20	*WY*	*2*

National Climatic Data Center

Top 10 rankings : **BOLD** Bottom 10 rankings : *Italics*



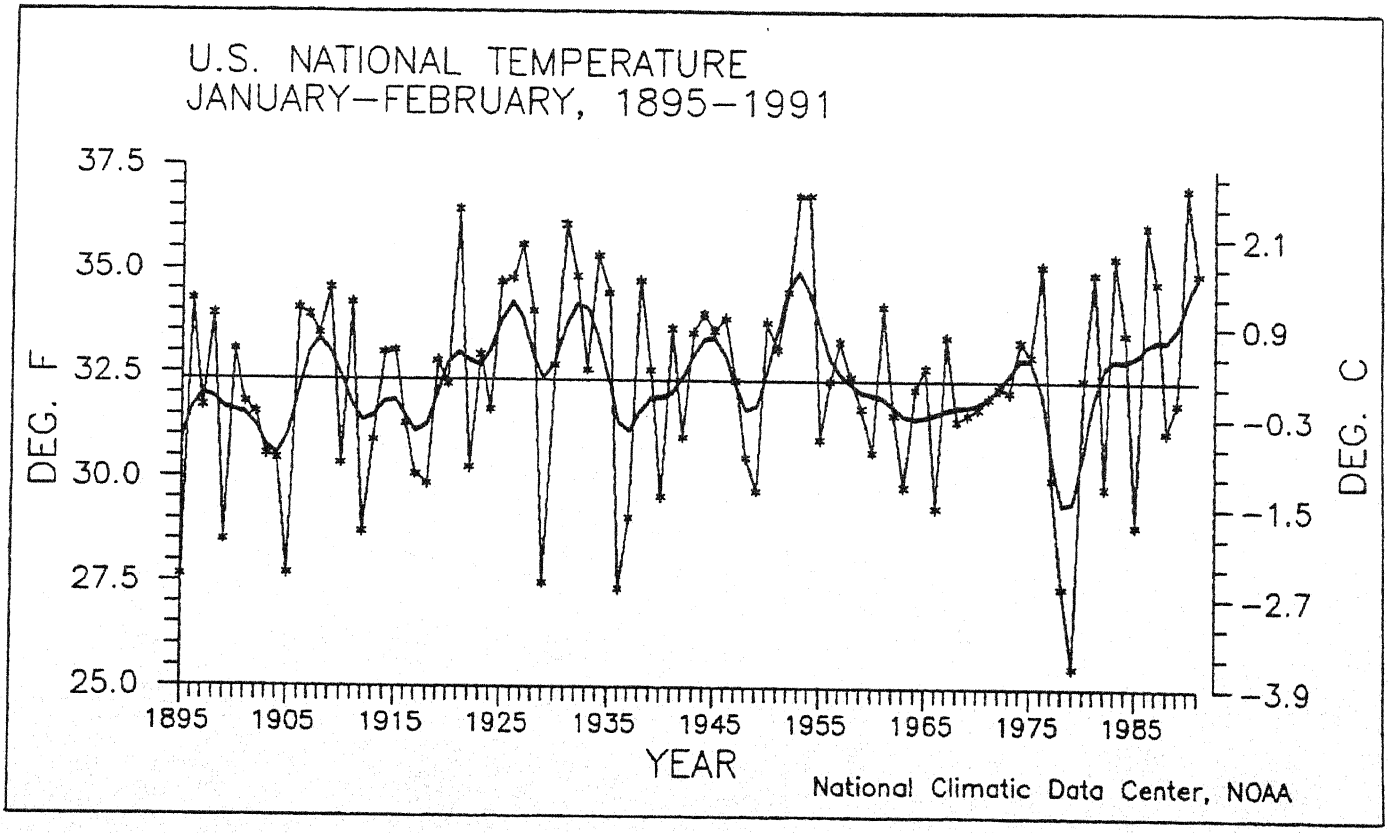
The first two months of 1991, particularly February, have been rather dry, ranking as the 24th driest such period during the past 97 years. While parts of the Southeast have experienced abnormally wet 1991 weather (top 10 wettest Jan.-Feb.: LA, FL, GA, and MS), significant dryness has occurred in the Far West, northern Rockies, central Plains and western Corn Belt, and Northeast (top 10 driest Jan.-Feb.: WY, VT, OR, ID, MI, NV, KS, IL, IA, MT, CT, NH, OK).

TEMPERATURE RANKINGS FOR JAN–FEB 1991, BASED ON THE PERIOD 1895 TO 1991. 1 = COLDEST AND 97 = WARMEST.

STATE	*RANK*	*STATE*	*RANK*	*STATE*	*RANK*	*STATE*	*RANK*
AL	61	IA	63	NE	81	RI	85
AZ	**88**	KS	80	NV	78	SC	69
AR	42	KY	74	**NH**	**88**	SD	78
CA	**88**	LA	50	NJ	85	TN	65
CO	42	ME	57	NM	62	TX	55
CT	87	MD	84	NY	82	UT	46
DE	70	MA	77	NC	77	**VT**	**90**
FL	83	MI	68	ND	83	VA	84
GA	66	MN	68	OH	74	WA	83
ID	78	MS	62	OK	81	WV	71
IL	64	MO	53	OR	81	WI	66
IN	71	MT	86	PA	82	WY	87

National Climatic Data Center

Top 10 rankings : **BOLD** Bottom 10 rankings : *Italics*



Similar to last year, prolonged cold air intrusions have been absent in 1991, especially during February, ranking as the 11th warmest Jan.-Feb. since 1895. Only 4 states (AZ, CA, NH, VT) had one of the ten warmest Jan.-Feb. on record; however, the remaining states were ranked either in the middle or upper (warm) third of the historic temperature distribution, producing a relatively mild start to the year.

TABLE 1. SELECTED STATIONS WITH 150% OR MORE OF THE NORMAL PRECIPITATION AND 5.00 INCHES OR MORE PRECIPITATION; OR, STATIONS WITH 8.00 INCHES OR MORE PRECIPITATION AND NO NORMALS DURING FEBRUARY 1991.

STATION	TOTAL (INCHES)	PCT. OF NORMAL	STATION	TOTAL (INCHES)	PCT. OF NORMAL
YAKUTAT, AK	18.82	186.9	JACKSON, TN	7.60	170.8
TUPELO, MS	10.90	***	MERIDIAN, MS	7.41	161.8
MUSCLE SHOALS, AL	10.54	245.1	JUNEAU, AK	7.40	198.9
KODIAK, AK	10.15	200.6	KNOXVILLE, TN	6.99	168.4
GREENWOOD, MS	9.72	214.1	BOWLING GREEN, KY	6.89	173.1
COLUMBUS AFB, MS	9.41	***	MEMPHIS, TN	6.47	150.1
MERIDIAN NAS, MS	8.50	***	GALVESTON, TX	6.30	269.2
MCCOMB, MS	8.47	***	LUFKIN, TX	6.21	203.6
HUNTSVILLE, AL	8.41	175.6	HOUSTON, TX	5.79	174.9
CHATTANOOGA, TN	8.12	172.8	VERO BEACH, FL	5.46	190.9
BATON ROUGE, LA	7.85	157.9	BRISTOL, TN	5.34	155.7

(Note: Stations without precipitation normals are indicated by asterisks.)

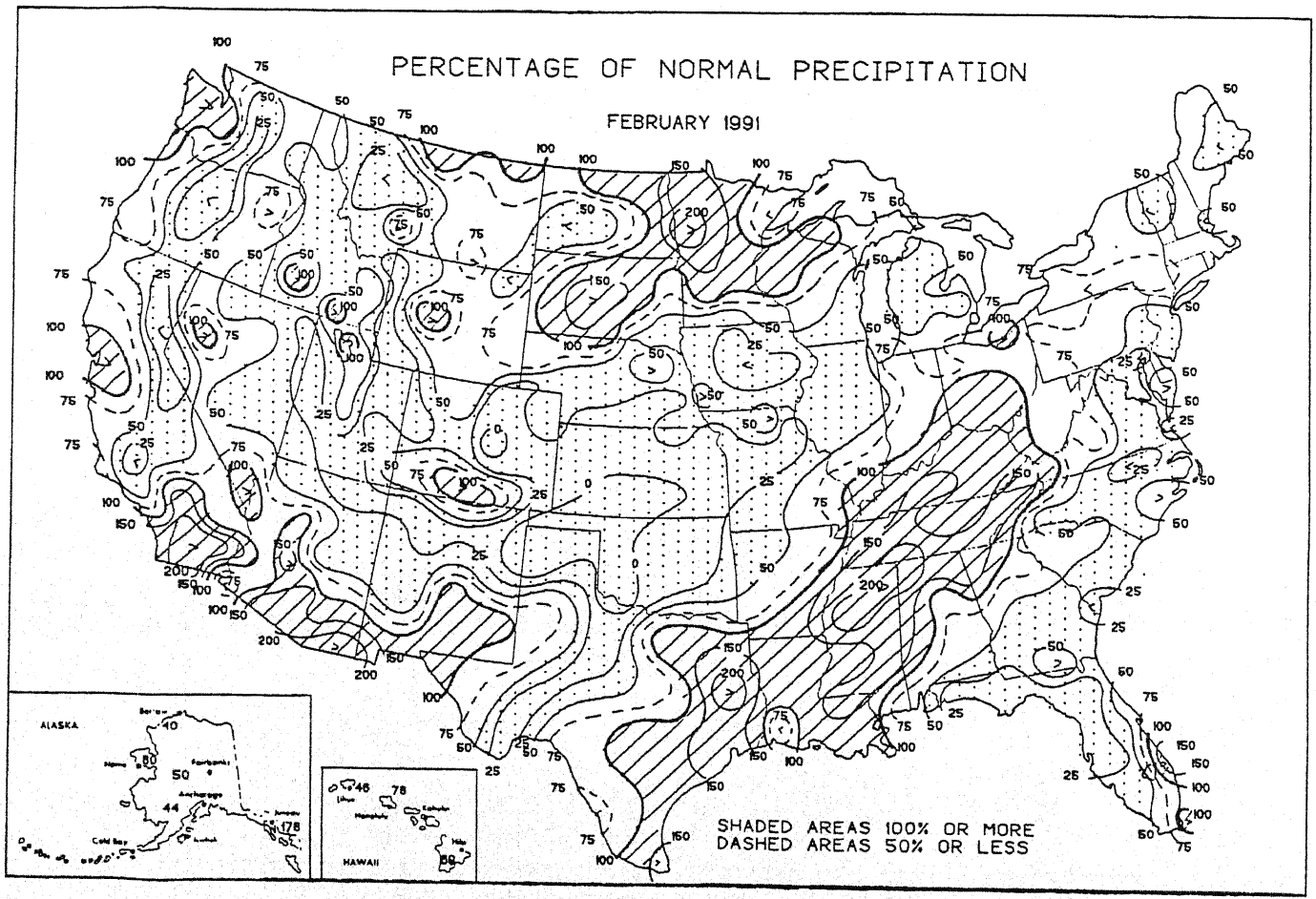


Figure 2. *February 1991 percent of normal precipitation. Most of the contiguous U.S., Alaska, and Hawaii recorded subnormal February precipitation, with the lowest percentages in the Far West, nation's midsection, and along the East Coast. In fact, most of southern Kansas, western Oklahoma, the Texas Panhandle, and northeastern New Mexico received NO monthly precipitation. Surplus February precipitation was limited to the lower Mississippi, Tennessee, and lower Ohio Valleys, the upper Midwest and northern Great Plains, and extreme southern Arizona and California, the latter area receiving most of its precipitation during the last 2 days of the month.*

TABLE 2. SELECTED STATIONS WITH 40% OR LESS NORMAL PRECIPITATION AND NORMAL PRECIPITATION 3.00 INCHES OR MORE DURING FEBRUARY 1991.

STATION	TOTAL (INCHES)	PCT. OF NORMAL	NORMAL (INCHES)	STATION	TOTAL (INCHES)	PCT. OF NORMAL	NORMAL (INCHES)
SAVANNAH, GA	0.26	8.2	3.17	PENSACOLA, FL	1.05	21.4	4.90
GAINESVILLE, FL	0.33	10.9	3.02	CAPE HATTERAS, NC	1.06	26.2	4.05
TAMPA, FL	0.41	13.6	3.02	DOVER AFB, DE	1.08	34.1	3.17
RALEIGH-DURHAM, NC	0.69	20.2	3.41	RICHMOND/BYRD, VA	1.09	35.1	3.11
APALACHICOLA, FL	0.70	19.2	3.64	AUGUSTA, ME	1.12	35.1	3.19
VALPARAISO/EGLIN AFB, FL	0.75	17.9	4.20	ALLENTOWN, PA	1.14	38.0	3.00
BANGOR, ME	0.76	23.1	3.29	GREENSBORO, NC	1.15	34.3	3.35
EASTPORT, ME	0.83	22.1	3.76	DANVILLE, VA	1.15	34.3	3.35
NORFOLK, VA	0.84	25.7	3.27	MILLVILLE, NJ	1.16	35.8	3.24
HAMPTON/LANGLEY AFB,VA	0.86	24.6	3.49	ATLANTIC CITY, NJ	1.21	36.4	3.32
TALLAHASSEE, FL	0.87	17.5	4.98	ALBANY, GA	1.24	26.6	4.67
CHARLESTON, SC	0.94	28.0	3.36	CHARLOTTE, NC	1.32	34.8	3.79
ORLANDO, FL	0.98	31.5	3.11	WAYCROSS, GA	1.42	34.4	4.13
FLORENCE, SC	1.01	30.0	3.37	MACON/ROBINS AFB, GA	1.45	34.2	4.24
ANDERSON, SC	1.04	26.1	3.98	MACON, GA	1.74	39.2	4.44

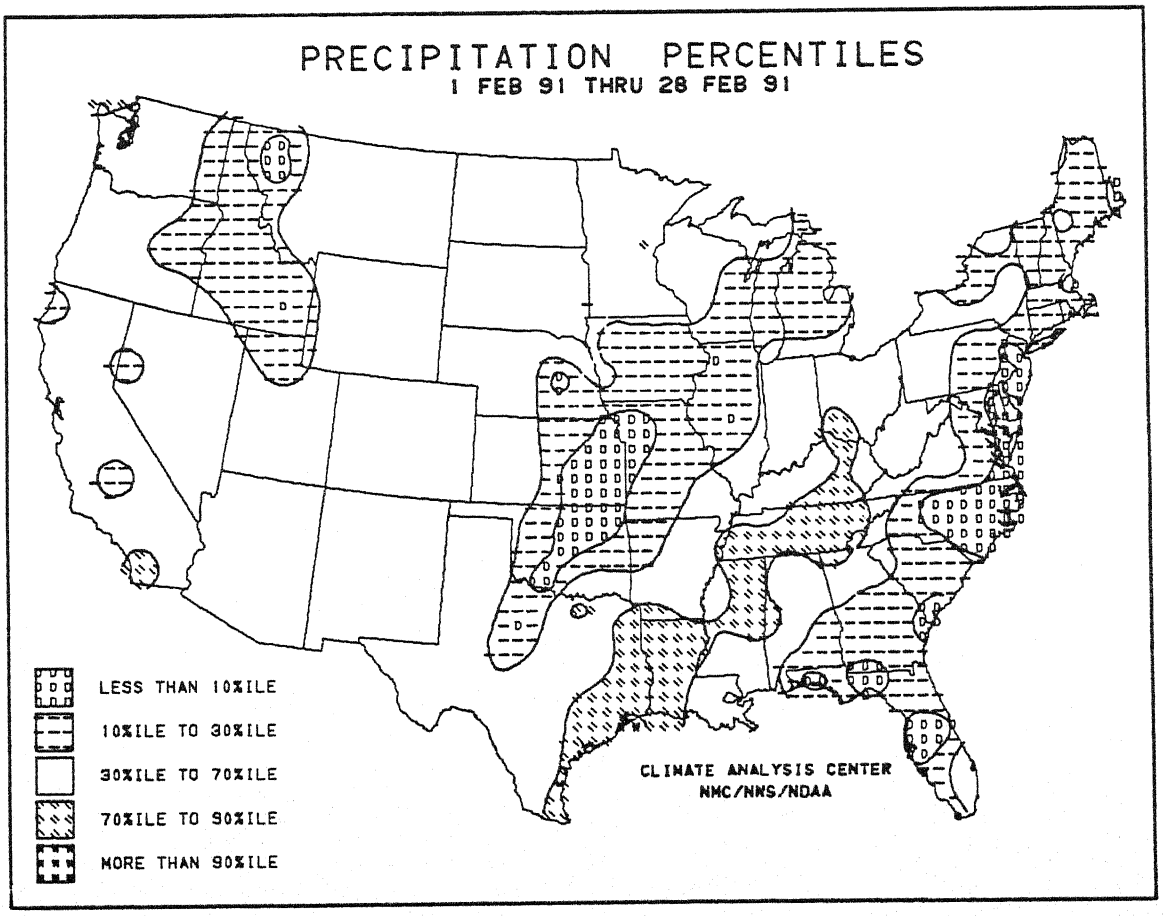


Figure 3. *February 1991 precipitation percentiles. Significant February dryness [<30%ile] was widespread along the Atlantic Seaboard, in the southern and central Great Plains, western Corn Belt, and central Great Lakes region, the northern Rockies, and parts of California. The dryness in the southern and central High Plains was not depicted since this area is normally dry during February. Substantial February wetness [>70%ile] was limited to the western Gulf Coast northeastward through the Tennessee Valley into the lower Ohio Valley, and in extreme southern California.*

TABLE 3. FEBRUARY 1991 AVERAGE TEMPERATURES 9.5°F OR MORE ABOVE NORMAL.

STATION	DEPARTURE (°F)	AVERAGE (°F)	STATION	DEPARTURE (°F)	AVERAGE (°F)
GLASGOW, MT	+16.2	31.8	HURON, SD	+11.3	29.7
HAVRE, MT	+15.3	36.0	LINCOLN, NE	+11.2	37.6
LEWISTOWN, MT	+14.5	38.8	GRAND ISLAND, NE	+11.0	38.3
DEVIL'S LAKE, ND	+14.5	22.5	NORFOLK, NE	+10.8	34.7
BOZEMAN, MT	+14.2	36.1	SIOUX FALLS, SD	+10.6	29.8
CUT BANK, MT	+13.9	36.3	PIERRE, SD	+10.5	32.1
WILLISTON, ND	+13.9	29.1	OMAK, WA	+10.3	40.6
BISMARCK, ND	+13.3	28.0	VALENTINE, NE	+10.3	34.0
DICKINSON, ND	+13.2	31.0	WATERTOWN, SD	+10.2	25.1
MILES CITY, MT	+13.1	35.2	NORTH PLATTE, NE	+10.1	37.6
MINOT, ND	+13.0	26.6	ALEXANDRIA, MN	+10.0	22.2
WORLAND, WY	+12.6	34.2	GRAND FORKS, ND	+10.0	19.3
BILLINGS, MT	+12.4	41.0	PHOENIX, AZ	+9.9	66.0
ABERDEEN, SD	+12.4	27.9	SALINA, KS	+9.8	42.8
JAMESTOWN, ND	+12.3	24.9	RAPID CITY, SD	+9.7	36.0
GREAT FALLS, MT	+12.1	39.2	SIOUX CITY, IA	+9.7	33.1
BUTTE, MT	+11.6	33.1	WICHITA, KS	+9.5	44.6
HELENA, MT	+11.3	37.6	CONCORDIA, KS	+9.5	41.2

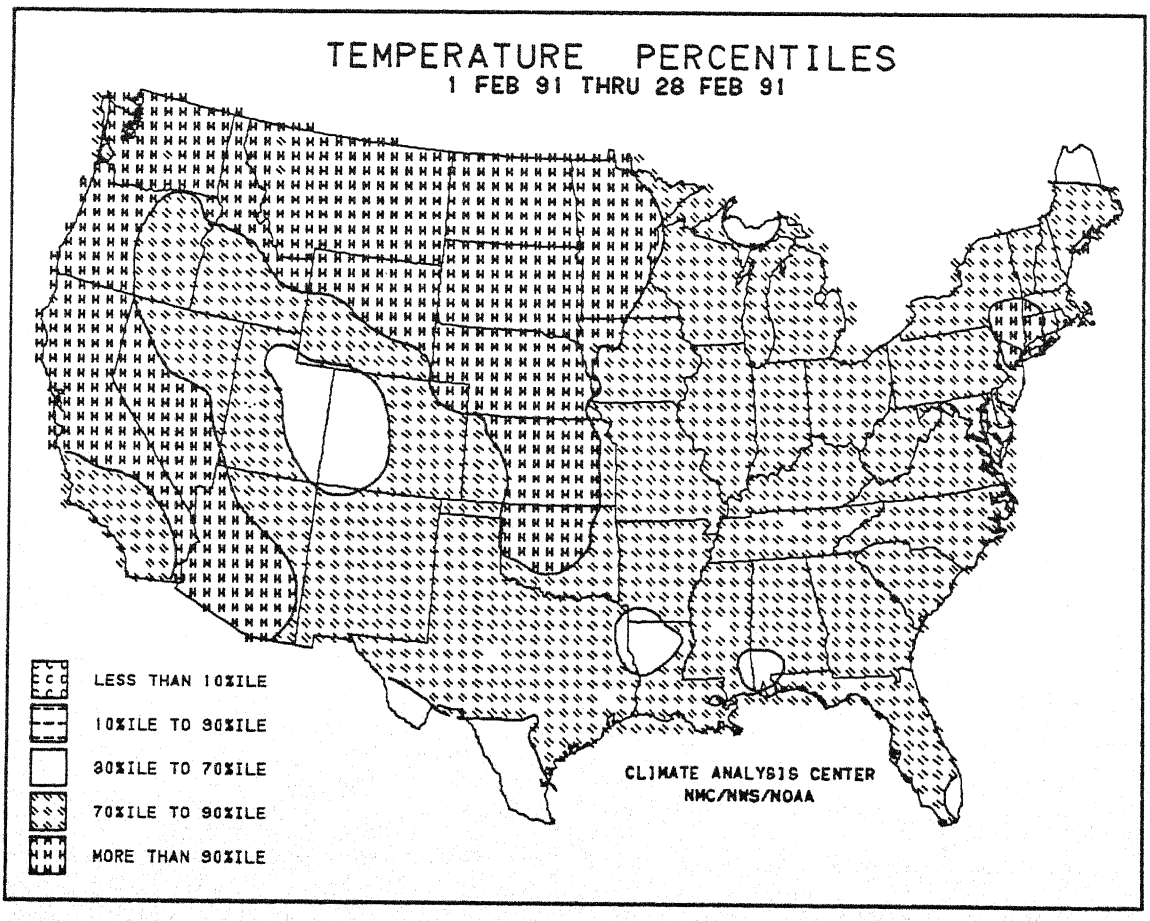


Figure 4. February 1991 temperature percentiles. Nearly all of the lower 48 states experienced significant February warmth [>70%ile], with much of the Far West, northern Rockies, and northern half of the Plains observing percentiles in the upper (warm) 10% of climatological occurrences. Not surprisingly, February 1991 was the third warmest February on record nationally as 7 of 9 regions recorded one of the ten warmest Februarys since 1895. There were no substantial cold anomalies as very few locations measured subnormal monthly temperatures (see Figure 5).

TABLE 4. FEBRUARY 1991 AVERAGE TEMPERATURES 0.0°F OR MORE BELOW NORMAL.

STATION	DEPARTURE (°F)	AVERAGE (°F)	STATION	DEPARTURE (°F)	AVERAGE (°F)
ST. PAUL ISLAND, AK	-12.6	9.7	BETTLES, AK	-0.5	-5.8
COLD BAY, AK	-4.7	22.8	GAINESVILLE, FL	-0.4	59.0
KODIAK, AK	-3.4	27.3	BETHEL, AK	-0.2	5.9
ADAK, AK	-3.0	30.1	KOTZEBUE, AK	0.0	-4.5
ILIAMNA, AK	-1.6	15.8	KING SALMON, AK	0.0	14.7
GRAND JUNCTION, CO	-1.4	32.0			

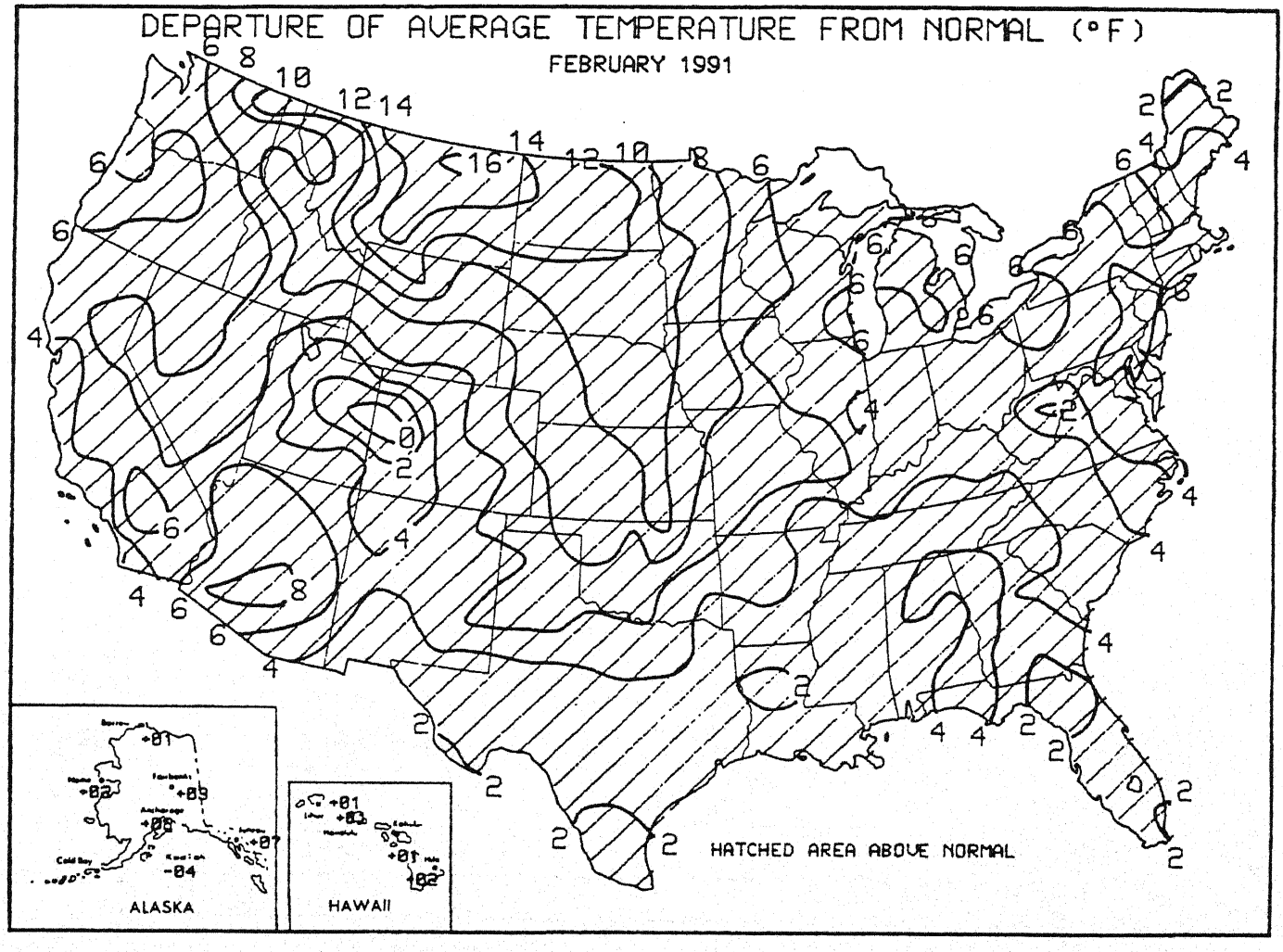


Figure 5. February 1991 average temperature departure from normal (°F). Anomalously mild conditions covered much of the lower 48 states and most of Alaska, particularly in the south-central and southeastern sections of the state. The Alaskan departures would have been much greater if an early February cold snap not occurred. The greatest departures (more than +10°F) were found in the upper Missouri Valley and northern third of the Great Plains, and temperatures averaged between 4°F and 8°F above normal in the Pacific Northwest, Southwest, Northeast, and the northern two-thirds of the Plains and northern Rockies. Elsewhere, Hawaii was slightly above normal while the Aleutian Islands and extreme western Alaska observed subnormal monthly temperatures.

TABLE 5. RECORD FEBRUARY PRECIPITATION.

STATION	TOTAL (INCHES)	NORMAL (INCHES)	PCT. OF NORMAL	RECORD TYPE	RECORDS BEGAN
ADAK, AK	1.57	5.24	30.0	LOWEST	1942
TALLAHASSEE, FL	0.87	4.98	17.5	LOWEST	1940
NORFOLK, VA	0.84	3.27	25.7	LOWEST	1947
RALEIGH-DURHAM, NC	0.69	3.41	20.2	LOWEST	1947
TULSA, OK	0.38	1.72	22.1	LOWEST	1939
KANSAS CITY/INTL., MO	0.20	1.23	16.3	LOWEST	1972
MISSOULA, MT	0.19	0.79	24.1	LOWEST	1947
SAVANNAH, GA	0.26	3.17	8.2	LOWEST	1951
COLUMBIA, MO	0.11	1.89	5.8	LOWEST	1961
GRAND ISLAND, NE	0.06	0.79	7.6	LOWEST	1939
OKLAHOMA CITY, OK	0.03	1.29	2.3	LOWEST	1947
HELENA, MT	0.02	0.44	4.5	LOWEST	1880
FT. SILL/HENRY POST AAF, OK	0.00	1.30	0.0	LOWEST	1876
WICHITA FALLS, TX	0.00	0.98	0.0	LOWEST	1951
HOBART, OK	0.00	0.91	0.0	LOWEST	1951
WICHITA, KS	0.00	0.84	0.0	LOWEST	1954
GAGE, OK	0.00	0.82	0.0	LOWEST	1951
MEDICINE LODGE, KS	0.00	0.81	0.0	LOWEST	1951
RUSSELL, KS	0.00	0.79	0.0	LOWEST	1951
LEWISTOWN, MT	0.00	0.66	0.0	LOWEST	1951
EAGLE, CO	0.00	0.62	0.0	LOWEST	1951
AMARILLO, TX	0.00	0.55	0.0	LOWEST	1892
DODGE CITY, KS	0.00	0.54	0.0	LOWEST	1941
DALHART, TX	0.00	0.45	0.0	LOWEST	1951
ELKHART, KS	0.00	0.45	0.0	LOWEST	1951
TUCUMCARI, NM	0.00	0.38	0.0	LOWEST	1951
CUT BANK, MT	0.00	0.33	0.0	LOWEST	1951
COLORADO SPRINGS, CO	0.00	0.29	0.0	LOWEST	1951
CLAYTON, NM	0.00	0.28	0.0	LOWEST	1951
ALAMOSA, CO	0.00	0.26	0.0	LOWEST	1954

Note: Trace precipitation is considered ZERO precipitation. Stations with no precipitation are only included if normal precipitation is 0.25 inches or more.

TABLE 6. RECORD FEBRUARY AVERAGE TEMPERATURES.

STATION	AVERAGE (°F)	NORMAL (°F)	DEPARTURE (°F)	RECORD TYPE	RECORDS BEGAN
BILLINGS, MT	41.0	28.6	+12.4	HIGHEST	1947
HELENA, MT	37.6	26.2	+11.3	HIGHEST	1880
PHOENIX, AZ	66.0	56.1	+9.9	HIGHEST	1877
LEWISTON, ID	47.7	38.5	+9.2	HIGHEST	1951
YUMA, AZ	66.6	60.1	+6.5	HIGHEST	1878
MISSOULA, MT	34.9	28.4	+6.5	HIGHEST	1947
LAS VEGAS, NV	55.9	50.0	+5.9	HIGHEST	1937
SALEM, OR	48.7	42.8	+5.9	HIGHEST	1951
RED BLUFF, CA	56.1	50.4	+5.7	HIGHEST	1878
PORTLAND, OR	48.7	43.2	+5.5	HIGHEST	1873
MEDFORD, OR	47.7	42.4	+5.3	HIGHEST	1947
QUILLAYUTE, WA	46.4	41.9	+4.5	HIGHEST	1966

TABLE 7. RECORD FEBRUARY EXTREME TEMPERATURES.

STATION	EXTREME (°F)	DATE	RECORD TYPE	RECORDS BEGAN
MIAMI, FL	89	23 FEB 91	HIGHEST	1940
KEY WEST, FL	85	26 FEB 91	HIGHEST	1945
FRESNO, CA	80	26 FEB 91	HIGHEST	1940
SACRAMENTO, CA	76	25 FEB 91	HIGHEST	1940
INTERNATIONAL FALLS, MN	55	02 FEB 91	HIGHEST	1939
ANCHORAGE, AK	48	28 FEB 91	HIGHEST	1943

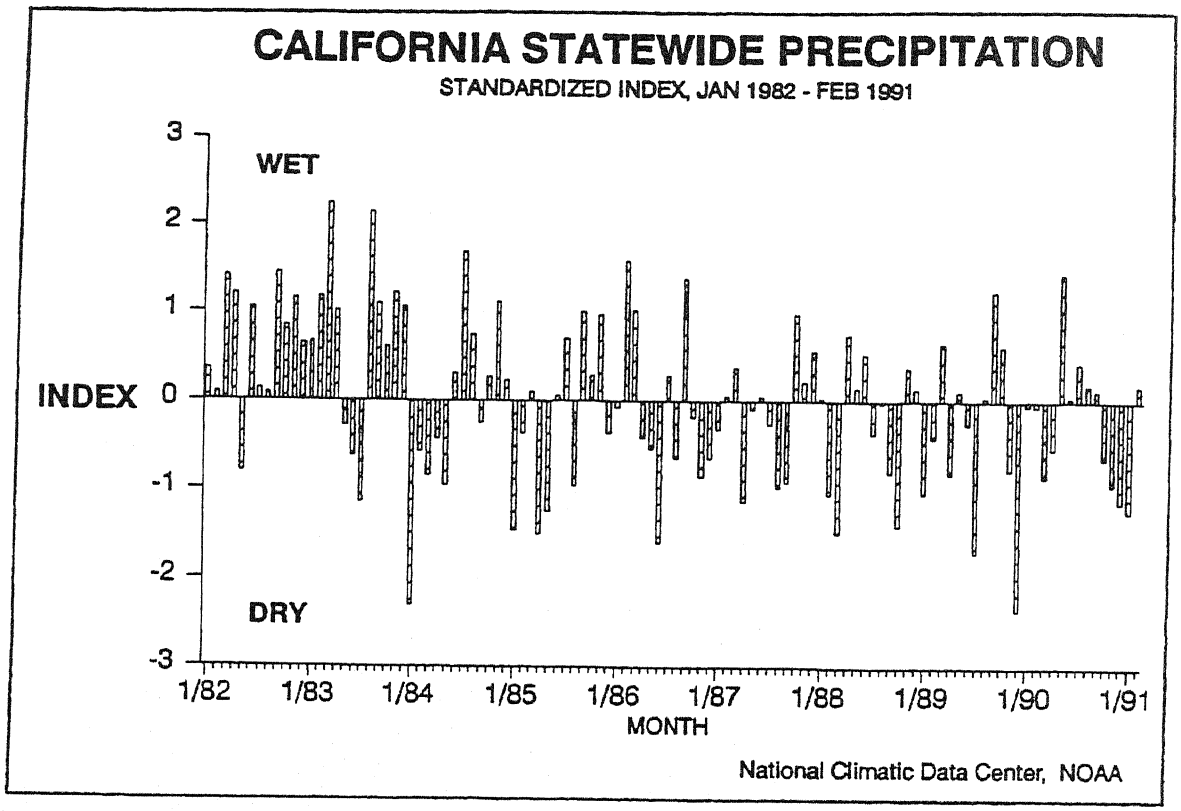


Figure 6. California monthly statewide precipitation (standardized index) during Jan. 1982 - Feb. 1991. The standardized precipitation index gives a more accurate indication of the local normal climate, especially with a pronounced winter maximum and summer minimum. Since late 1986, precipitation has been deficient across the state, particularly during the normally wet winter months, when much of the annual hydrologic recharging takes place (by increasing mountain snowpack). During the past 5 years, most of the significantly wet months have generally occurred outside of the rainy season [Oct.-Apr.], resulting in much less efficient hydrologic recharging.

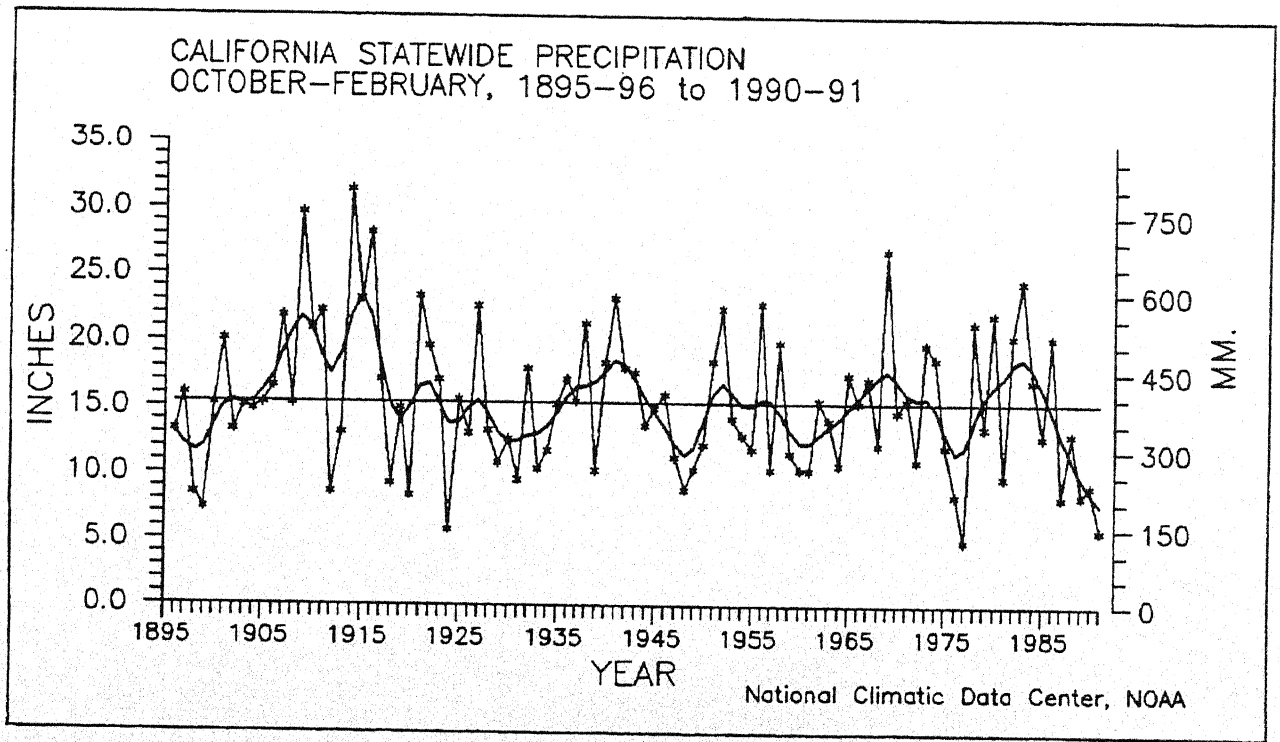


Figure 7. California October-February statewide precipitation, 1895-1896 to 1990-1991. Through February, California has experienced its third driest rainy season on record, continuing a trend of abnormally dry fall and winter months since 1986-87. The filtered curve (which depicts longer-term variations) has reached alarmingly low levels this year.

STATISTICS FOR SELECTED RIVER BASINS: PRECIPITATION RANKING FOR OCT '90–FEB '91 , WHERE RANK OF 1 = DRIEST, 96 = WETTEST, BASED ON THE PERIOD 1895 TO 1991; AREAL PERCENT OF THE BASIN EXPERIENCING SEVERE OR EXTREME LONG–TERM (PALMER) DROUGHT, AND AREAL PERCENT OF THE BASIN EXPERIENCING SEVERE OR EXTREME LONG–TERM (PALMER) WET CONDITIONS, AS OF FEBRUARY, 1991. RIVER BASIN REGIONS AS DEFINED BY THE U.S. WATER RESOURCES COUNCIL.

RIVER BASIN	PRECIPITATION RANK	% AREA DRY	% AREA WET
Missouri Basin	18	40.0	.0
Pacific Northwest Basin	21	47.6	.7
California Basin	*3*	83.0	.0
Great Basin	*3*	73.2	.0
Upper Colorado Basin	34	68.3	.0
Lower Colorado Basin	50	10.4	.0
Rio Grande Basin	58	.0	22.2
Arkansas–White–Red Basin	32	3.7	1.8
Texas Gulf Coast Basin	73	.0	.0
Souris–Red–Rainy Basin	25	57.0	.0
Upper Mississippi Basin	62	.0	6.2
Lower Mississippi Basin	**89**	.0	5.5
Great Lakes Basin	**90**	.0	45.1
Ohio River Basin	**93**	.0	64.3
Tennessee River Basin	**92**	.0	41.7
New England Basin	81	.0	7.7
Mid–Atlantic Basin	81	.0	10.1
South Atlantic–Gulf Basin	81	9.4	3.0

Top 10 Rankings: **Bold** Bottom 10 Rankings: *Italics*